METAL INDUSTRY

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Electro-Platers' Society Meeting in Bridgeport

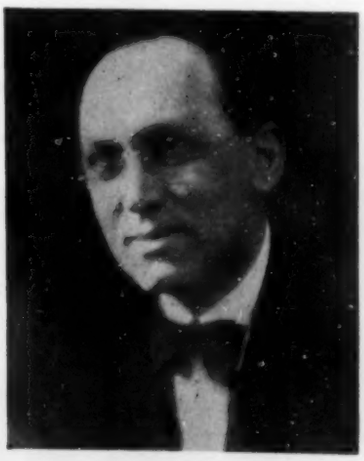
Record Attendance. Strong Technical Sessions. Full Exhibit. Interesting Plant Visits. Bridgeport Branch Wins Metal Industry Cup. W. M. Phillips Awarded Founder's Gold Medal. Specifications Adopted. Assistant Foremen Admitted to Membership. T. F. Slattery, New President

THE 23rd Annual Convention of the American Electroplaters' Society was held in Bridgeport, Conn., June 10-13. The first and foremost thing to report about this convention is that it was without question, the most interesting and from every angle the most successful convention in the history of the Society.

Delegates, members and guests began to arrive Sunday afternoon, June 9th. On Monday there was a large crowd at the registration headquarters in the Stratfield Hotel. In almost no time the hotels in Bridgeport were filled to overflowing, and those who had not had the foresight to make reservations in advance had difficulty in securing accommodations.

T. F. SLATTERY
President, A. E. S.

JOSEPH UNDERWOOD
Vice-President, A. E. S.



E. S. THOMPSON
Secretary-Treasurer

W. J. R. KENNEDY
Editor, Monthly Review

JOSEPH P. SEXTON
President, Bridgeport Branch

R. J. O'CONNOR
Chairman, General Committee

In brief, we give below some of the salient features which made this convention stand out above others in the past.

High Spots of the Week

Registrations totalled about 500.

The attendance at the annual banquet was over 600.

The exhibition of electroplating equipment, supplies and electróplated products, the first ever held in the history of the Society, on such a scale, had 65 exhibitors who filled all the available space.

A contest was held for a Sterling silver cup, donated by **Metal Industry,** for the best exhibit of plated work by the branches of the Society. This cup was won by the Bridgeport Branch.

The plant visits arranged for the members, to the Bridgeport Brass Company, International Silver Company and the American Tube and Stamping Company, were of the highest interest. They gave the platers the opportunity to see the processes by which the base metals were made and also methods of plating silver in one of the largest and most progressive manufacturing companies in the world.

Among the recreational features were the golf tournament, which was won by **Austin Wilson** of the Detroit Branch, and the annual baseball game between the East and West. They were enjoyed immensely by the participants and their audience. We venture to say that even casualties in the ball game got a considerable amount of pleasure. The game was won by the East by a score of 11 to 3 in spite of the excellent pitching and management of **Rudy Hazucha** for the West. Sympathies are tendered to **Joe Dinan** who took a severe blow on the head while catching, but continued playing, pluckily and caught an excellent game. **K. W. Schwartz** had the ill fortune to break an elbow sliding into third base on a three-bagger which he had hit. Everyone wishes Kevie a speedy recovery.

The **Founders Gold Medal** for the best paper was awarded to **W. M. Phillips** of the General Motors Corporation. It was a popular award to a man who has been one of the leading lights of the Society for years, and whose work has aided both the Society and the industry in many ways.

One of the most enjoyable bits of entertainment was the Open House party by the International Fellowship Club on Monday, June 10th, in the Jungle Room of the Stratfield. The job was handled mainly by **John Oberender,** who needs no introduction. His appointment was greeted as proof that the party would be a success and John lived up to expectations.

H. M. CHERRY
President, I. F. C.

JOHN OBERENDER
Vice-President, I. F. C.

T. A. TRUMBOUR
Secretary-Treasurer

Practically the entire registration turned out and enjoyed a very sociable evening.

As stated above, a Sterling silver cup was donated by **Metal Industry** to create a competitive spirit among the Branches of the American Electroplaters' Society, as an award for the best exhibit of plated and finished work by any of the Branches. The winning Branch will have possession of the cup for one year, and it will belong permanently to that Branch which receives the judges' award on three occasions. The judges on this occasion consisted of **George B. Hogaboom,** chairman, **George Gehling, Vernon Grant, Walter Meyer** and **Patrick Sheehan.**

The cup was awarded to the Bridgeport Branch for its extraordinarily fine exhibit, with **Carl Heussner** making the award.

METAL INDUSTRY CUP
For the Best Branch Exhibit

Another absolutely new feature was presented by Hanson-Van Winkle-Munning Company, consisting of a daily newspaper called the H-VW-M Convention News. Copies of this paper were delivered each morning on June 11, 12 and 13, to all of the delegates. The contents of this novel daily included advance programs, convention news, notes, reviews of programs of the preceding day, very snappy and amusing personals and a wide variety of other items of interest to those in attendance.

The New York Herald-Tribune was placed at the door of each registrant, every morning, with the compliments of the **Norton Company,** Worcester, Mass.

P. H. Langdon, publisher of **Metal Industry,** was elected an Honorary Member of the American Electro-Platers' Society.

Progressive Steps by the Society

Some very important steps were taken at the business meeting. In the first place assistant foremen were admitted to associate membership in the Society. This marks the end of a long fight to broaden the base of the organization, spreading its influence and providing for a steady flow of members from the younger generation in the industry. Congratulations to the Society for its progressive step!

The President was authorized to appoint a committee to investigate the advisability of having a large exposition of plated work in New York City part of the proceeds of which will be used for research work.

The tentative specifications for electroplating on steel were adopted as reported by the committee on these specifications. They were passed on to the American Society for Testing Materials for action at their meeting of June 24th, and they were adopted by that Society as Tentative Specifications. (See pages 248 and 250-55 of this issue.)

New Officers

New officers of the Society for the coming year were elected, the slate being as follows:

President, **Thomas F. Slattery,** Baltimore-Washington Branch.

First vice-president, **Joseph Underwood,** Philadelphia.

Second vice-president, **Patrick J. Sheehan,** Milwaukee.

Secretary-treasurer, **E. S. Thompson,** Erie, Pa. (Re-elected.)

Editor of The Monthly Review, **W. J. R. Kennedy,** Hartford-Connecticut Valley Branch. (Re-elected.)

Officers of the International Fellowship Club for the coming year were elected as follows:

President, **H. M. Cherry,** Detroit, Mich.

Vice-president, **John Oberender,** Stamford, Conn.

Secretary-treasurer, **Thomas A. Trumbour,** New York. (Re-elected.)

The 1936 convention will be held in Cleveland, Ohio. It was a good choice, but a big job has been handed to Cleveland, capable as this Branch is, to match the work that Bridgeport did. It was undoubtedly a wonderful job.

Technical Sessions

As never before, the papers read at this convention indicated the growth in intellectual stature of the Society. They were the reports of trained men, leaders in the electroplating industry. Moreover they were not just "high-brow." They never lost sight of the practical aspects of plating. They recognized the need for sound, correct theory, but they also pointed the way to the practical applications of theory in plant operations.

For the following summary of the individual papers we are indebted to **George B. Hogaboom,** chairman of the Papers Committee, under whose direction the technical program was planned and put into effect.

Raymond J. O'Connor, chairman of the General Committee, made an address of welcome to A. E. S. delegates and friends. **Joseph Sexton,** president of the Bridgeport Branch, also welcomed the assemblage.

Summaries of Papers

PERSONAL REMINISCENCES

By C. H. Proctor

Mr. Proctor talked of economic conditions in the United States and as he found them in his several trips around the World. The foreign view is that this country has too many men of diversified opinions trying to rule. We have an excellent President, and he should be supported.

Connecticut has been preeminent in electroplating since 1846. The trademark "1847" marks the first milestone. Mr. Proctor conceived the idea of advancement of the electroplater to the level of a scientist, in 1890 while in Ansonia. This thought eventually resulted in the formation of the A. E. S. The Society was organized in the old Hotel Astor, New York City, 1909, as National Electro-Platers Association.

Mr. Proctor advised having the plating department under the best man who can be obtained, training assistants and welcoming the cooperation of the chemical laboratories.

For the good of the Society, the doors of membership must be kept open to chemists, assistant platers and all interested in plating.

Look into the future! If the A. E. S. will have foresight it can be one of the greatest organizations in existence.

THE BRIDGEPORT A. E. S. CONVENTION

By Hedley J. Richards

Come Platers and friends, give heed to this call
Make this Bridgeport Convention the greatest of all
Just give me your closest attention.
Don't worry about the eternal how
But live in this great and glorious now
This Wonderful Bridgeport Convention.

You are each of you, all of you, put to a test
Just come out on top with your very best, best,
And you'll have a great time every day
Have a welcome for all and a permanent smile
Be one band of brothers, make this week worth while
Successful in every way.

The program is ripping without any doubt
There's just simply nothing that's missed or left out
It's perfect in every way
Addresses of welcome this day have their share
With an opening speech from his honor The Mayor
And speech making fills out the day.

Then comes changing of by-laws and making revisions
But be sure and comply with Supreme Court Decisions
And never be revolutional
Not only that changes should be for the best
But legal and lawful when put to the test
They must be Constitutional.

Then receptive to science the Platers become
And we hear from our dear old friend Dr. Blum
And the Bureau of Standards attainments.
On the action of Acids on steel we then hear
And what causes plating to stick and adhere
Then comes eats and entertainments.

Tuesday morning a paper on Black Nickel is read
And we learn how to plate Antimonial Lead
And how Barrel Plating is done.
In the coloring of metals we're put up to date
And how Zinc die castings are easy to plate
And then it is time for some fun.

For then comes a time of complete relaxation
With frolic and fun and without education
And a luncheon with nothing to pay.
Tuesday afternoon's program is simply entrancing
Athletics and eats and our ball game and dancing
And a shore dinner ends a great day.

Next in line comes Doc Lukens, he surely is grand
He tells things in a way that we all understand
But then comes a paper that's tough.
It should give a Plater complete satisfaction
To learn all about metal X-ray diffraction
But to me t'would be very deep stuff.

When Tom Slattery next day gives the word to begin
We learn the correct deposition of Tin
And the value of tests of corrosion.
For Doctor Blum shines on all kinds of a test
On this kind of stuff he is right at his best
On inside or outside exposion.

I've just about finished and with my last rhyme
I hope that you'll all have a glorious time
All kinds of enjoyment and fun.
We've had wondrous times in Conventions of Yore
And I just hope that all of you see many more
Good luck to you ever one.

WELCOME TO BRIDGEPORT

By the Honorable Jasper McLevy, Mayor of Bridgeport

The holding of conventions and talking over problems of an industrial nature is the best possible manner in which to restore confidence and to meet the problems of the day. These gatherings will help to improve economic and social conditions.

Welcome to Bridgeport! No key needed!

PRESIDENTIAL ADDRESS

By H. A. Gilbertson

A brief history of electroplating, touching upon Faraday, Elkington, Sheffield Plate, etc., from 1740-1850. Electroplating succeeded it.

Successful modern plating began with the development of the plating generator by our Honorary Member, Dr. Edward A. Weston.

Charles H. Proctor had vision and the result is the A. E. S., its research work, specifications and standards.

Today plating must be done better than ever. The stamp of quality must be had!

THE MANUFACTURER AND THE PLATER

By A. P. Munning

A knowledge of the chemical, electrical and mechanical processes is necessary to accomplish good plating. The establishment of Research Committee was greatest step forward of the A. E. S., giving opportunity for manufacturers to obtain cooperation of the foreman plater and the scientist through the Bureau of Standards and the American Society for Testing Materials.

Improvement in plating practice and standards are essential for future progress. Manufacturers must

have proper men and the best available equipment. The modern plating room produces work on a scale unbelievable ten years ago.

The adoption of definite standards is a revolution and it will make the manufacturers conscious of the fact that plating is one of the most important factors in producing good work. Knowledge is power and a good manufacturer will recognize a good plater. Help others to progress in their work and you will be successful.

"Foreman Plater" is not the correct designation. "Supervisor of Finishing Departments" is well worth consideration.

Walter Fraine in commenting upon Mr. Munning's talk, welcomed him back into the active work in electroplating. He told of Mr. Munning's progressive spirit and his great work in the past and was certain that in the future he will accomplish more than ever.

REPORT OF RESEARCH WORK AT THE BUREAU OF STANDARDS

By Dr. William Blum

Results of the exposure tests on nickel and chromium has been completed and published. Zinc and cadium tests in Pittsburgh has been completed. At Key West and Sandy Hook some specimens are still intact. At Washington and New York City all are still free from rust.

In the specifications the minimum thickness is to be the important factor, rather than the average thickness. The Drop Test was briefly described. This has been published in the Monthly Review. (See also **Metal Industry,** April, 1935, page 133-4.)

The future work is the study of coatings on nonferrous metals. Some steel specimens are to be tested to confirm previous tests. About 30% of the specimens have been finished. It is hoped to have the exposure tests commenced by next Spring.

The deposition of nickel at current densities of up to 400 amperes per sq. ft. has been studied; comparison made of sulphate and chloride solution. The latter gave, to surprise of all, the hardest deposit.

Our knowledge of the fundamental principles of electroplating is not sufficient to permit us to predict what will happen in any experiment. Dr. Wick and Dr. Kasper are working on government problems that indicate the interest taken in electroplating.

France and Germany do not have any society doing work similar to the A. E. S. England has the Electro-Depositors Society. Considerable admiration was evident in those countries of the work being carried on by the A. E. S.

THE EFFECT OF DIFFERENT ACIDS ON COLD ROLLED STEEL

By E. T. Candee

The author studied the effect of different acids, hydrochloric, sulphuric acid, nitric acid and the electrolytic bright dip. Samples were pickled 1-2-5 minutes and then tested in an Amsler machine for brittleness. He allowed steel to stand 1 day—7 days —14 days and then tested them again. Oxide films on steel were also tested. Several graphs were shown illustrating the data obtained. The electrolytic bright dip gave the best results and was adopted.

THE ADHESION OF ELECTRO DEPOSITS

By Walter R. Meyer

Adhesion is the force which holds the electrodeposit to the basis metal. This paper was a brief review of previous work and a presentation of the data assembled during the past year. Results were illustrated by slides and specimens.

The effect of pickling, polishing and buffing, cleaning and the plating solutions in the adhesion was studied. Cold worked surfaces must be removed if good adhesion is to be had. Cleaning is most important and poor work may be due to hydrogen embrittlement, deposition of metal impurities in the cleaner and impurities that may be present in the basic metal. Addition agents are often the cause of poor adhesion.

This talk was an excellent exposition of the subject and was the result of admirable research work. It showed as no other paper has, the value of the study of metallurgy applied to electroplating.

BLACK NICKEL PLATING

By Joseph Downes

A brief history of black nickel plating. The first solution was published in Brass World in 1904. This formula was so well constructed that it has not been necessary to change except for very heavy plating.

The formula used and the methods employed at Remington-Rand, Inc. plant at Middletown, Conn., were given in detail, for a 2,500 gallon solution in a semi-automatic plating machine.

The analyses of the deposit and that of the solution were given showing the importance of the chemical control of the solution especially the sulphur content.

PLATING ANTIMONIAL LEAD

By Walter Meyer and Clarence Helme

Metal goes under severe changes in buffing, making it difficult to obtain an adherent coating. The cleaning must be perfect. Solvent degreasers are recommended for preliminary cleaning. Strong alkali cleaners react rapidly and a zinc soap may be formed on the surface of the metal. New alkali cleaners must be made at regular intervals. Use a separate cleaner when a reverse current is employed.

After cleaning, a warm caustic dip is recommended so as to slightly etch the surface and obtain a bond.

Different acid dips were discussed in detail. Ten per cent nitric acid will give positive results.

The thickness of the deposit directly on antimonial lead is limited to .0005". Copper cyanide coating is advised for heavy coating. Coloring of metal should be done most carefully to prevent over-heating of the metal which will cause the best deposits to peel.

PLATING CADMIUM IN A BARREL

By Austin F. Fletcher

The study was made of the amount of cadmium used in work, special attention being given to the unnecessary excess deposits.

The surface area was measured and a definite current density was employed. Allowance was made for the efficiency of the barrel unit and of the plating solution. The cost of drag out of the solution was one-tenth of a cent per sq. ft. of the surface of work plated. Cleaner cost was calculated as 0.0005c./ft.^{2}

Best results obtained when a larger load was used and plating time increased.

Specimens of work plated illustrated this talk.

ELECTROPLATING ZINC BASE DIE CASTINGS

By Charles Costello

The several operations of finishing previous to plating were discussed.

In cleaning it is essential to use some organic solvent to remove grease and dirt from recesses and pores of metals. This is followed by a mild alkaline electric cleaner. Time of cleaning will vary for different classes of work and should always be as short as possible. Rinsing well is of great importance. Acid dip is necessary to neutralize any alkali remaining on work and to slightly etch the surface to obtain a good bond of the electrodeposit. Discoloration of the basis metal must be avoided.

Cyanide copper having a thickness of 0.0003" can be used without the necessity of buffing. Carbonate content not permitted to go above 4 oz. per gallon. Brighteners not recommended.

If copper is not buffed at least 0.0005" of nickel is advisable. Warm solutions give excellent results.

The different solutions that can be used were given and their merits considered.

COLORING OF METALS

By Harry MacFayden

The several operations for coloring and timing of metals were explained. The plating of non-metallic compounds such as bakelite, with nickel and chromium is possible if the methods given are followed.

Several interesting experiences in producing special finishes were told. Many required much ingenuity and what may be called "plating tricks."

HISTORY OF TIN PLATING

By August Erspaner

This was a most compelte history of tin plating, extending from the earliest day of plating to the methods used today. It included an excellent bibliography for any investigator.

THE MECHANISM OF ELECTROPLATING

By Dr. Hiram S. Lukens

In this paper Dr. Lukens examined the behavior of the current in an electroplating solution. He described the behavior by means of equipotential lines. An equipotential line is an imaginary line through the solution all points of which are at the same electrical potential. The position of these lines are of importance because their location, and their spacing, that is whether they are crowded together or spread apart, will give an idea where the current in a solution is flowing.

Dr. Lukens determined and located the lines by using a shallow plating bath with a transparent bottom under which he placed a piece of cross section paper. Then by using two exploratory electrodes it was possible to find the equipotential points over this paper and plot a line on a similar piece of paper outside of the cell. The results of his work clearly showed that the equipotential lines exist throughout the whole mass of the solution, even behind the anode and cathode thus accounting for the solution of and the plating of metal from apparently off areas. By using anodes and cathodes of various shapes Dr. Lukens was able to study the concentration of lines at edges and corners and thus throw considerable light on the high currents and difficult plating conditions encountered at such points. His work suggested remedies for some of these difficulties.

SPECTROGRAPH ANALYSIS AS APPLIED TO ELECTROPLATING

By Dr. D. T. Ewing

Dr. Ewing first gave an explanation of the spectrographic method for the estimation of small amounts of elements in the presence of several other constituents. Impurities that would be undetectable by chemical analysis can be discovered by the spectroscope. The method consists of volatilizing the material under examination by means of an arc and passing a narrow beam of light from this arc through a prism. The beam is spread out by this means and a result of vertical lines obtained, which can be photographed.

Such a photograph is called a spectrogram. No two elements will give the same kind of a spectrogram. Also any metal or element which is present in the sample under the arc will produce characteristic lines in the spectrogram.

Thus Dr. Ewing was able to take a nickel solution that was suspected of containing zinc and examine it by the spectroscopic method and prove that actually it contained no zinc because the characteristic lines of zinc were not present in the spectrogram. Lines due to copper were found, however, and this metal was therefore discovered to be the culprit instead of zinc.

In addition to detecting the presence of an element in extremely small amounts, the spectroscopic method can be used to determine the actual percentage of that element which is present. This is done by comparing the intensity of the lines on the spectrogram of the unknown material with that of lines on standard spectrogram which has previously been prepared from materials containing a measured amount of the elements.

X-RAY DIFFRACTION OF METALS

By Dr. H. R. Isenburger

X-ray diffraction analysis is the study of the arrangement of the atoms in materials by means of x-rays. By means of the x-ray it is possible to determine not only the arrangement of the atoms within a crystal, but also the size and the shape of particles making up a crystal.

When a metal is subjected to heat, mechanical, or chemical treatment the above characteristics will be somewhat changed. The x-ray can be used to detect such changes. Thus in experienced hands the x-ray method will advance still further our knowledge of the structure and composition of electrodeposited coatings.

MEASURING THICKNESS OF ELECTRODEPOSITS WITH A MICROSCOPE

By Dr. Carl Heussner

One of the first points emphasized by Dr. Heussner was that the microscope need not be considered as an instrument for the research laboratory only, but can be used by the electroplater for the routine determination of thickness of deposits. He described a simple and rapid procedure. The sample is first cut from the article. A band saw can be used in many cases for this purpose. It is then mounted in a small clamp and ground to a flat surface, first on grinding wheels and finally on 400 emery paper mounted on a rotating steel disc.

For many examinations no further polishing is necessary. In the case of the softer metals where

further processing is needed to remove the heavy scratches, fine polishing is done on cloth covered wheels, using fine abrasive powders such as levigated alumina.

The prepared sample is then placed under the microscope lens where the thickness of the deposit can be seen. By means of a special eye piece using a movable crosshair, the thickness can be accurately measured.

Dr. Heussner has made measurements of deposits both by means of the microscope and by chemical analysis and found that the results are comparable. The microscopical values were slightly higher.

Copies of this paper were distributed which described the methods employed at the Chrysler Corporation for microscopical examination. A microscope was set up in the lecture hall and gave attending electroplaters an opportunity to see the relatively simple set up which is required, through the courtesy of Bausch & Lomb Optical Company.

WHY METALS CORRODE

By Dr. R. A. Burns

Dr. Burns illustrated how the question of whether a metal corrodes is dependent on the conditions which surround it. Thus, although we know gold is a noble metal and very resistant to corrosion, yet if conditions could be imagined where chlorine prevailed in the atmosphere, the gold would exist not as metal but as the chloride.

After several introductory remarks on the general nature of corrosion, a number of slides were shown which illustrated how the potential of a metal changed under various conditions and thus effected the behavior of the metal from the standpoint of corrosion.

The formation of films over metal surfaces was pointed out as being of importance in corrosion.

In a discussion after the paper, Dr. Burns explained that although lead is not attached by ordinary tap water it is readily corroded by distilled water. This is due to the fact that the tap water contains some constituent, probably a silicate, which forms a lead silicate film. This film is tough and adherent and protects the metal from further attack.

AIR CONDITIONING

By A. W. Knecht

Mr. Knecht first reviewed the advantages of air conditioning and included the factors of better working conditions, resulting in improved work, a better morale among the employees and less lost labor time from respiratory troubles.

The advantage of an air conditioned lacquer room consisted in freedom from "blushing" of the lacquer and also removal of dust particles from the air that would damage the appearance of the lacquered article.

The operations involved in the air conditioning system were described in general as requiring a distributing system as well as a conditioning system. The conditioning system must remove moisture and sensible heat from the air and deliver this to the room at proper humidity and temperature.

Moisture removal is accomplished either by means of hygroscopic material such as calcium chloride or silica gel, or else by refrigeration which freezes out the moisture.

In small rooms unit air conditioners may be used.

The estimated cost of installing air conditioning in a plating room 75 x 20 feet, containing the usual equipment is about $8,000, using the refrigerating system.

ROLLING OF BRASS

By Dr. A. K. Crampton

In this paper the progress that has been made in the manufacture of brass was reviewed. The greatest single improvement has been the introduction of the electric furnace. Furnaces with capacities up to 2,500 lbs. are now common and some with a 3,500 lb. capacity are now in use.

Considerable progress has been made in rolling mill construction. Rolling speeds have greatly increased from the speed of 80 ft. per minute which once prevailed. Dr. Crampton traced the improvement of the roll neck bearings from the old babbit type to bronze and now to the new fibre bushed bearings. These were said to give very good service and to keep the roll necks in fine condition. Roller bearings are also being used today, especially on high speed finishing mills.

Some of the newer types of rolling mills were described. In the Steckel mill the metal is pulled through the rolls by being wound up on a power driven mandrel. When one pass is completed, the metal is pulled back through the rolls by a mandrel on the other side of the stand. Thus a heavy reduction by means of many reciprocating passes can be made without handling the stock. The Hazelett mill consists of two rolls, one of which has a flange on the end. Molten metal is poured at that end as the rolls rotate and is rolled into solid metal.

BRIGHTENING OF THE PLATING ROOM

By R. A. Coolahan

Mr. Coolahan described the appearance of a new material called "Tornesit" which is being used to make paints that have unusual properties. Tornesit was developed in Germany and is a chlorinated rubber product. It is being employed by many paint manufacturers in the production of paints that are very resistant to acids, alkalis and moisture. Because of these properties it gives promise of being the ideal paint to use in plating rooms.

With such a material as this available, the plater will have no excuse for not brightening up his department which is an effect that we will all admit is mighty scarce at present. Tornesit paints are made in all colors.

TIN PLATING

By E. A. Shields

This was a very interesting paper for the practical plater inasmuch as Mr. Shields explained the details of the operation of a 3,000 gallon alkaline tin solution. The evaporator units for refrigerators are given thickness of .0005" or over of tin in the above tank. A continuous conveyor is used.

A perforated steel plate is used as an insoluble anode and is placed inside the evaporator in order to obtain the required thickness of tin in that section.

Due to the use of the insoluble anode, tin must be added to the solution at frequent intervals in the form of sodium stannate. The soluble anodes supply about 48% of the tin which is plated out. The formula for the solution is:

Sodium stannate	6-12 oz. per gal.
Caustic soda	2½ oz. per gal.
Sodium acetate	1¾ oz. per gal.

After plating, the evaporators are scratch brushed since this finish will not show up scratches and tool marks that inevitably occur when the unit is mounted.

Mr. Shields mentioned several practical points such as the absolute necessity of keeping contacts clean. Hooks should be soldered in the anode.

Considerable spray is given off and a caustic powder settles on everything in the vicinity of the machine. It was stated that in one way the spray is desirable inasmuch as it tends to remove carbonates and caustic from the solution, constituents that would otherwise rapidly build up to harmful concentrations.

In discussion, the question was asked whether the spray did not carry out all of the constituents of the solution, including the metal, but Mr. Shields said that as far as they could find, no metal was present in the dust which had settled around the room.

The anode current density on this job is held at about 14 amps. per oz. of caustic in solution. When the anodes are corroding properly they have a yellowish green color.

In the operation of this solution it was pointed out that frequent analysis is imperative. The chief additions are sodium stannate to supply metal and acetic acid to reduce excess caustic to the proper value.

OPTIMUM METAL CONCENTRATION

By D. A. Cotton

In this paper a series of experiments were explained the results of which will undoubtedly be of great importance to electroplaters.

The solution that was used was made up of single salts (in varying amounts) nickel chloride 3 oz. and boric acid 4 oz./gal. A set of solutions was made each of which had a different concentration of single salts and in steps of 2 oz./gal. of metallic nickel. The highest concentration was 12 oz. of nickel. The chloride and boric acid were held the same.

Experiments were conducted first at 80° F. and then at 120° F. The plating was done on brass plates to a thickness of .00025". A whole range of current densities was investigated under each set of conditions as mentioned above.

The behavior of each kind of solution was measured by taking readings on its resistance, the anode and cathode polarizations and efficiencies. A great mass of data was collected. It was presented in the form of curves.

In general Dr. Cotton found that the solution with high nickel concentration, at the higher temperature and high chloride content gave best results. His experiments are of much interest inasmuch as they furnish information on solutions, the metal concentrations of which lies between the ordinary nickel solutions and the very high concentration and temperature solutions reported by Dr. Blum and Dr. Kaspar of the Bureau of Standards.

RELATIVE VALUE OF ACCELERATED CORROSION AND OUTDOOR EXPOSURE TESTS

By Dr. William Blum

The basis of this talk by Dr. Blum was the work he and his associates have done in conjunction with the A. S. T. M. in making tests of metal coatings. The A. E. S. has contributed to the support of this work.

Although the outdoor exposure tests are set up at five different locations in the United States, Dr. Blum called attention to the fact that there are more than six different kinds of weather in the Country and that the results from the six present locations may not be directly applicable to a location with different conditions of atmosphere and corrosive influences.

The ultimate test of a plated article is in actual service. It was explained that the actual service life may often be considerably longer, even in outside duty, than the life shown under outdoor exposure test. For example, the life of plated automobile parts is considerably extended if the parts are cleaned and waxed or oiled occasionally, and this is frequently the practice in the case of most car owners.

When it comes to accelerated tests the salt spray still appears to be of importance in spite of its faults. Two factors in the use of the salt spray were mentioned by Dr. Blum as being sources of improved and more consistent results. The first was temperature control of the spray cabinet. The second was judging the resistance of the article under test by noting the size and number of rust spots at the end of a given period, such as 100 hours. At present the general practice is to run the article until it breaks down and record the number of hours it has stood up.

The ability of zinc and cadmium coatings to protect depends on their thickness. Since the recent development of the dropping test, a method is available for measuring this thickness. Thus a simple thickness test may replace other tests taking more time, such as the salt spray.

In the same way the protection afforded by nickel and copper plate is a function of the porosity. The amount of porosity can readily be determined by the peroxyl test when steel is the base and we again have a test which can in many cases supply information of value in much less time than the salt spray or outdoor exposure.

The printed results of the work on outdoor exposure and accelerated tests appear in U. S. Bureau of Standard's Research Papers 712 and 724, which may be obtained from the Superintendent of Documents for five cents each.

ADVENTURES IN ELECTROPLATING COPPER FROM AMMONIACAL SOLUTIONS

By Dr. E. A. Vuilleumier

The solution used by Dr. Vuilleumier consisted of copper sulphate to which ammonia water had been added until the precipitate which forms redissolves, and then adding excess of ammonia. A deposit was obtained from this solution which was smooth, dense and adherent.

After performing such a test Dr. Vuilleumier returned the next day to plate another specimen but instead of the smooth deposit of the previous run he obtained a loose spongy mass of copper crystals that could be washed off in a stream of water. This behavior was suspected to be due to the reduction of part of the copper in the solution to the cuprous condition. This was affected by the copper metal anode which had been allowed to hang in the solution between the two tests mentioned above.

Recalling one of the older methods for performing an electro-analysis of a copper solution which specified the use of ammonium salts, Dr. Vuilleumier added some ammonium sulphate to the solution which gave the spongy deposits. He obtained a smooth dense deposit again.

The explanation of this behavior lies in the fact that excess ammonia in the presence of ammonium sulphate is capable of dissolving cuprous oxide.

The fact that cuprous oxide was the cause of the trouble was proved by again making up a new solution as described above and adding some cuprous oxide to it. The result obtained was a loose spongy deposit.

Some record should be made of the report Dr. Vuilleumier gave on the improved state of the electroplating art. It was never a difficult matter in earlier days, he said, to illustrate remarks or peeling of deposits to his students by the many actual examples which surrounded them. Today, however, conditions are much different and he is very much concerned over the time when a certain professor at Dickinson College will turn in his five year old car for a new one. The rear bumper on that car is the last remaining specimen of peeling as an example for his students.

OBSERVATIONS ON ELECTROPLATING IN EUROPE

By Dr. William Blum

The meeting of the Faraday Society in London brought together many scientists who discussed new methods of studying the structure of films and deposits. At a meeting of the Electro-Depositors' Technical Society, the specifications and testing of electrodeposits were considered.

Researches on electrodeposition and related subjects were observed at Imperial College, University of Sheffield, Cambridge University, National Physical Laboratory, British Aeronautical Research Laboratory (Farnboro) British Non-Ferrous Research Association, Woolwich Arsenal, Sorbonne (Paris), Materialprufungsamt and Reichsanstalt (Berlin) and University of Amsterdam.

The supply houses of W. Canning and Company in Birmingham, and of the Langbein-Pfannhauser Company in Leipzig, are both very busy. Electroplating plants, especially those connected with the automobile industry, were visited in England, France and Germany. Methods of operation are generally similar to those in America, although there is more general use of anode pickling of steel, and of air-agitation in nickel baths. The use of automatic plating equipment is increasing.

The success of the trip was largely due to the courtesy and hospitality of many persons in all the countries visited.

Exhibitors Literature

A great deal of very interesting and valuable literature was distributed by the exhibitors. It had such direct bearing on the needs and the work of electroplaters that we are listing below the material which was available so that those who did not attend the convention can obtain it directly from the exhibitors.

Apothecaries Hall Company, Waterbury, Conn. Nucast Nickel Anode; Industrial Chemicals and Plating Supplies; Ahcoloid Metal Cleaner; Ahco Composition.

Bausch & Lomb Optical Company, Rochester, N. Y. Electroplaters Microscopes.

Belke Manufacturing Company, 947 N. Cicero Ave., Chicago, Ill. Plating Supplies Price-List; New Verti-Disc Filters; Belke Rack Insulation; Sheet Rubber Lining.

Bias Buff & Wheel Company, Inc., 430 Communipaw Avenue, Jersey City, N. J. Handbook for Buyers and Users of Buffs; Principle of Bias Buff; What Does a Bias Buff Cost Per Wheel; Reigel Gloves.

G. S. Blakeslee and Company, 19th Street & 2nd Avenue, Chicago, Ill. Blakeslee Patented Degreasing Machines.

Bruce Products Corporation, 5712 12th Street, Detroit, Mich. Non-Ridge Polishing Wheel.

Bullard Company, Bridgeport, Conn. Bullard-Dunn Process for Cleaning Prior to Electroplating.

Carborundum Company, Niagara Falls, N. Y. Aloxite TP Manual of Modern Polishing Practice.

Chandeysson Electric Company, 4054 Bingham Avenue, St. Louis, Mo. Electroplating Generators.

Exhibit of Electroplating Equipment and Supplies and Electroplated products

Chromium Process Company, Shelton, Conn. Chromium Plating on Small Parts.

Egyptian Lacquer Manufacturing Company, 90 West Street, New York. Lacquers, Enamels and Thinners.

J. B. Ford Sales Company, Wyandotte, Mich. Metal Cleaning With Wyandotte Products.

B. F. Goodrich Company, Akron, Ohio. Korolac Plating Rack Protection.

Grasselli Chemical Company, 629 Euclid Avenue, Cleveland, Ohio. Hull & Strausser Test for Determining Thickness of Cadmium and Zinc Electro-Deposits; Cadalyte, a Process and Product of Cadmium Plating; Kreider Centrifugal Dryer.

Hammond Machinery Builders, Inc., Kalamazoo, Mich. Rite-Speed Electric Polishing and Buffing Lathes; Variable Speed Polishing and Buffing Lathes; Heavy Duty Electric Polishers and Buffers; Ball Bearing Polishing and Buffing Lathes.

Hanson Van Winkle-Munning Company, Matawan, N. J. Hanson-Munning Electrolytic Bright Dip; Loxol Metal Coating; General Catalog of Polishing and Plating Equipment and Supplies.

Hunter & Havens, Bridgeport, Conn. Valdura Metal Coating; Asphalt Aluminum Paint.

Jackson Buff Corporation, 21-03 41st Avenue, L. I. City, N. Y. The Airway Ventilated Buff.

Kocour Company, 4724 S. Turner Avenue, Chicago, Ill. Analytical Set for Determining Thickness of Cadmium and Zinc Deposits; For Acid or pH Measurements; For Chloride in Nickel and Zinc Solutions; For Determining Free Cyanide in Cyanide Solutions; For Determining the Sulphuric Acid and Copper Sulphate in Acid Copper Solutions; For the Determination of Copper in Cyanide Copper and Brass Solutions; For Chromic Acid; Nickel Comparator; Cleaner Test Set.

LaSalco, Inc., 2822 Lasalle Street, St. Louis, Mo. Richards Barrel Plater; Cushioned Belt Grinder: Utility Barrel Plater.

Lea Manufacturing Company, Waterbury, Conn. Learok; Learok Method of Metal Finishing; Nickel-Glo; Buffing and Polishing Methods; Speed Calculator for Buffing Wheels.

MacDermid, Inc., Waterbury, Conn. Tartex Burnishing Compound; Solvtex Metal Cleaner.

MacFarland Manufacturing Company, 21-03 41st Avenue, L. I. City, N. Y. Cotton Buffs and Polishing Wheels.

McCathron Boiler Works, Waterbury, Conn. Tanks of All Descriptions.

Maas and Waldstein Company, Newark, N. J. Metalustre Enamels.

Magnus Chemical Company, Garwood, N. J. Magnusol; Magnus Cleaner-Gard; Magnus Hand Cleaner.

Matchless Metal Polish Company, 726 Bloomfield Avenue, Glen Ridge, N. J. Polishing and Buffing Compounds.

Metal Industry, 116 John Street, New York. Metal Industry; Platers' Guide, Platers' Guidebook.

A. H. Nilson Manufacturing Company, Bridgeport, Conn. Automatic 4-Slide Ribbon Stock and Wire Forming Machines; Special Dipping Machine; B. O. Foot Press; Wire Straighteners.

Norton Company, Worcester, Mass. Abrasives; Their History and Development; Price-List of Abrasive Products; Alundum Ceramic, Mosaic Tile; Norbide (Norton Boron Carbide); Research and Alundum Polishing Grain; Selection and Handling of Glue for the Polishing Room; What to Specify; Refractory Materials and Their Uses.

Oakite Products, Inc., 22 Thames Street, New York. How Simple Changes in Cleaning Operations Offset Rising Production Costs; Oakite News Service (a house organ).

Packer Machine Company, Meriden, Conn. Automatic Applicator for Feeding Composition; Automatic Polishing and Buffing Machines.

Pittsburgh Plate Glass Company, 2-10 Chester Avenue, Newark, N. J. Fletcher Gold Tip Glass Cutter; Color Is a Sales Factor.

Plating Products Company, 352 Mulberry Street, Newark, N. J. Measure Thickness of Cadmium and Zinc Deposits with the Chemicrometer.

Puritan Manufacturing Company, Waterbury, Conn. Purico Wonderbar; Composition For Buffing and Polishing.

Pyrene Manufacturing Company, 560 Belmont Avenue, Newark, N. J. Pyrene High Gloss Nickel Process.

N. Ransohoff, Inc., W. 71st Street, Carthage, Cincinnati, Ohio. Ideal Industrial Machinery; Ideal Tilting Ball Return Burnishing Barrel.

Raybestos-Manhattan Company, Inc., Manhattan Rubber Manufacturing Division, Passaic, N. J. Protective Rubber Lining and Covering For Industry.

Rex Products and Manufacturing Company, 13005 Hillview Avenue, Detroit, Mich. Vapor Degreasing and Cleaning Equipment; Solvent Cleaners.

R & H Chemicals Department, E. I. duPont de Nemours and Company, Inc., Wilmington, Del. R & H Chemicals For Modern Metal Treatment; Non-Flammable Chlorinated Solvents; Precious Metal Cyanides For Gold and Silver Plating; Operating Manual For Plating With Duozinc; Operating Manual For Copper, Brass, Bronze and Zinc Plating With Copper Cyanide and Zinc Cyanide; Electrotinning With the Sodium Stannate Acetate Bath.

Roxalin Flexible Lacquer Company, 800 Magnolia Avenue, Elizabeth, N. J. How Good Are You at Twisting and Bending Samples of Metal?

Schwartz Manufacturing Company, Matawan, N. J. Cotton Buffs.

Seymour Manufacturing Company, Seymour, Conn. Controlled Grain Anodes.

Stanley Chemical Company, East Berlin, Conn. In our June issue on page 199 we listed the Stanley Chemical Company, East Berlin, Conn., as a manufacturer of metal cleaners. This was an unfortunate clerical error. The Stanley company manufactures lacquers, synthetics, enamels and japans. Their exhibit at the Electro-Platers' convention was related to industrial lacquers and industrial coatings of various types.

Frederic B. Stevens, Inc., 510 3rd Avenue, Detroit, Mich. Automatic and Semi-Automatic Plating Equipment; Motor Generator Sets of the Electric Products Company; Mitchell Lathes.

Sterling Filter Manufacturing Company, 43 Hospital Street, Providence, R. I. Sterling Filter.

Tuttle Chemical Company, 245 7th Avenue, New York. Zialite Solution for Nickel Plating on Zinc and Other Metals, Including Aluminum.

Udylite Company, 1651 E. Grand Boulevard, Detroit, Mich. Udylite Line Switch; Ball Anode; Udylite Rheostat; Handiplater; Plating Barrel.

Williamsville Buff Manufacturing Company, Danielson, Conn. Williamsville High Grade Cotton Buffs.

Yankee Products Company, Bridgeport, Conn. Buffing and Polishing Compositions.

Zapon Company, Stamford, Conn. Lacquers, Enamels and Thinners.

Master Platers Hold Second Annual Convention

The Keynote of the Convention Is Permanent Co-operation Within the Job Plating Industry. Better Quality Plating for Job Shops

THE Master Electro-Platers' Institute of the United States held its second annual convention in Bridgeport, Conn., at the Stratfield Hotel, June 8 and 9th. The convention was attended by delegates from 13 of the 15 districts in the United States.

The first meeting was called to order by **Leo D. Jensen**, Vice-President, who acted as chairman in the absence of **James J. Gerity, Jr.** of Toledo, who was prevented from attending the convention by reason of illness. **Hugh Booth,** Executive Secretary, reported on the accomplishments of the Institute during the past year.

The Institute has set up Standards of Quality for Electroplated Coatings, following the recommendations of the American Electro-Platers' Society and the American Society for Testing Materials. Standards of Health and Safety have been drawn up. A scale of uniform discounts was adopted, more equitable than those that have been effective in the past. The industry has co-operated in maintaining fair wages and fair working hours. The most valuable accomplishment, however, has been the stimulation of group discussion of problems in the industry among the electroplaters, locally and between districts, leading to a fuller measure of cooperation than had ever before been achieved.

The industry is still faced with very serious problems. There is always the factor of internal competition between members and the need for keeping this competition on a fair and equitable basis. There is the need for maintaining relations with labor on a friendly basis. The industry is constantly threatened by competition from other processes and other materials which have the possibility of replacing plating work. There is also the danger of the manufacturers putting in their own plants instead of sending out their work.

This session proceeded with the formal business of winding up the Supplementary Code Authority and considering the immediate problems of the Institute. The delegates were unanimous in their opinion that the Institute must go on, regarding the Code Authority and the N.R.A. as something that was past and no longer had any present bearing on the electroplating industry.

Ben Josephs of Worcester read a report of the Policy Committee, outlining the services to be performed by the Institute within the funds available. A

MAXWELL M. WISE
President, M. E. P. I.

LEO D. JENSEN
Vice-President, M. E. P. I.

PHILIP SIEVERING, JR.
Vice-President, M. E. P. I.

plan was proposed by **M. M. Wise** of Detroit, to form a new local district including former Districts 11 and 9, and also southern Ohio and Buffalo, N.Y. This new district was to be placed in charge of **Hugh Booth,** who would at the same time continue to act as Executive Secretary of the National Institute. This plan was unanimously adopted and the budget, plans of operation, changes in the By-Laws necessary in order to effect this new set-up were left, by a resolution of the meeting, to a committee to be appointed by Mr. Booth. See page 263 of this issue for announcement.

In the evening a very pleasant entertainment and refreshments were provided by four of the prominent supply houses. Lea Manufacturing Company, Waterbury; Apothecaries Hall Company, Waterbury; Hanson-Van Winkle-Munning Company, Matawan, N. J., and United Chromium, Inc., New York.

At the meeting held on Sunday, June 9th, the Institute accepted the Specifications for Quality of Plated Coatings and the Procedure for Making Them effective throughout the industry, as adopted by the Committee on Standards of Quality. The meeting also agreed to submit for the consideration of the industry, the Recommendations for Standards for the Safety and Health of Workers as adopted by that Committee on January 20th; also the Tentative Cost and Estimating System and Cost Data Sheet proposed by that Committee on March 16.

A resolution was unanimously adopted tendering a vote of thanks to various members who had done outstanding work during the past year. Among these were **James J. Gerity, Jr.,** Toledo; **Leo D. Jensen,** Chicago; **Hugh Booth,** Executive Secretary; **Charles LeClair,** Assistant Secretary; **R. J. O'Connor,** Bridgeport; also the members of the former Code Authority. A resolution was passed unanimously to tender the best of wishes to the American Electro-Platers' Society for the success of its convention, and it was decided, tentatively, to hold the next meeting of the Institute at approximately the same time and at the same place as the American Electro-Platers' Society.

The following officers were elected for the coming year.

President: Maxwell M. Wise, Detroit.

Vice-presidents : Leo D. Jensen, Chicago; **Henderson M. Bell,** Cleveland; **C. F. Campbell,** Boston; **Philip Sievering Jr.,** New York; **H. E. Coombes,** Pasadena, Calif.; **J. S. Esposito,** Oakland, Calif.

Secretary-Treasurer: R. J. Nagle, Toledo, Ohio.

Counselor: James J. Gerity, Jr., Toledo.

The Annual Banquet was held on Sunday, June 9th and was addressed by A. P. Munning, Chairman of the Executive Committee of the Hanson-Van Winkle-Munning Company, Matawan, N. J., who gave a talk on Fostering Cooperation Through Trade Association Activity. The speech was illuminating in its frankness, its adherence to accuracy and detail and its recommendations for carrying on trade association work. A rising vote of thanks was tendered to Mr. Munning, after which the meeting adjourned.

The meeting presented a shining example of a group faced with grave problems on which they worked steadily and with the utmost seriousness. It it safe to say that the plans laid will solve these problems as they were fundamentally sound.

The Master Electro-Platers' Institute will, during the coming year, stress constantly the all-important factor of quality. It is by quality alone that the industry will continue to hold its old friends and to add to them. The Institute faces its future soberly, but with confidence.

J. B. ESPOSITO
Vice-President, M. E. P. I.

R. J. NAGLE
Secretary-Treasurer

JAMES J. GERITY
Counselor, M. E. P. I.

Fostering Cooperation Through Trade Association Activity

By A. P. MUNNING

Chairman of the Executive Committee, Hanson-Van Winkle-Munning Company, Matawan, N. J.

"Cooperative Courage" Among Competitors. Obstacles to and Advantages of Group Activity*

A. P. MUNNING

COOPERATION and the spread of knowledge in Trade Associations had their inception in the early middle ages. We find that men actively cooperated in Guilds and Associations for mutual benefit as early as 1217. They organized as Master Masons, Master Builders, Master Weavers, Master Jewelers and many other trades, as Guilds, and the best craftsmanship of those early days is directly attributable to their trade knowledge imparted collectively. Theirs were really closed and secret corporations, where proven artisanship was the requisite for membership, and jealous secrecy of their own knowledge prevalent.

But let the past be as it may. We have now progressed (over innumerable obstacles) to a period of cooperative trade associations, which are definitely organized to promote fair competition, standards of quality, fair compensation to workers, standards of safety and health, cost accounting, trade practices, and many other factors that were undreamed of only a few years ago. Furthermore, the United States Government has recognized and approved the work and policies of the many hundreds of honest Trade Associations in existence today, because they are constructive benefitting not only their own particular industry, but also the public, and all others who directly, or indirectly, follow their principles. Then, too, remember that today we work in the open. No secrets, no discrimination, no restrictions, and everybody welcome who is eligible.

Obstacles to Cooperation

Now, let us try to be specific, particularly relating to the Master Electro-Platers' Institute of the United States. The difficulty in all cooperation is:

1. The selfishness of the individual or company, engaged with others in a cooperative effort.

2. The lack of finances properly to carry on a program of education, contact among members and advertising, both to the members and to the public.

In using the term "selfishness," we do it in the broader sense. We are all so prone to believe that we are cooperating wholeheartedly when that cooperation is best for our own individual, or company interest. When we have to broaden out this cooperation so as to include all of the other members of the branch, who may be located in all parts of the country, we hesitate in agreeing upon a common policy or method, which may, in one or two instances, not fit in with our own particular ideas. It is undoubtedly true that, when we disagree on certain minor association policies, we are apt to grumble about them and say they are not applicable to our own particular problem. If we transgress without the knowledge of our friends in a cooperative enterprise, from the tenets adopted by the other members, whether justly or unjustly, we are first accused and then they proceed to do likewise, because we believe that the men who have subscribed to the principle have only done so by lip service.

Cooperation in the Plating Supply Industry

I well remember the first attempt in 1914 to form a trade association among the manufacturers in this line of business. There was unanimous lack of cooperation at the beginning. Each individual manufacturer considered himself better than the other. The larger concerns figured they were being outmaneuvered by the apparent chiseling tactics of the smaller concerns, and the smaller concerns figured they were being out-maneuvered by the greater purchasing and selling capacity of the larger ones. No one seemed to grasp the idea of uniformity in trade practice, of wanting to make a slight profit in a business which, up to that time, had resulted in seventy-five per cent of failure of all engaged in it. No one

*From a Talk at the Second Annual Banquet of the Master Electro-Platers' Institute, Bridgeport, Conn., June 9th.

wanted to spread knowledge to the public of the advantages derived from good plating, and good covering of base metals, until it was pointed out—"Your neighbor (competitor) is the first person you must get along with. Not because he is necessarily the same sort of person as you are, but because you are where you are, and he is where he is." When this became apparent, an "open-price" association was formed where are matters were threshed out in the open that related to the welfare and benefit of the industry as a whole, and from a small beginning, it embraced practically all of the factors in the industry who believed in the policy of "Live and Let Live." The result was the condition that we know of today, where our industry has expanded, from a scientific, material and utilitarian point of view, to such an extent that the gross annual volume is many times as great in 1935 as it was in 1914.

Talk about chiseling! We found companies, (and not only one) who worked on the principle that they could outsell their competitor, not because of quality or advantage, but because they could adulterate and make as good a product as their competitor at a lower price; or because their competitor had a greater overhead; or because they could fool the purchaser by the ordinary methods in vogue in the early days of blandishments and other extraneous business methods. Tripoli was selling at around 2¼c per pound when it actually cost approximately 3c per pound for labor and material. Other items were selling, to make up for this loss, at 15c to 18c per pound (when the supplier could get away with it) which cost 5c or 6c per pound. It was a juggling proposition with no joint study to cultivate fair practices or fair dealing with customers.

Know Your Competitor. Get the Facts

I have always held that if competitors would devote one-fourth of the time and patience to cultivating each other in a joint study of their problems that they do to the cultivation of their customers, then unfair competition, waste, and all the other ills which destructive competition develop, could be sensibly handled.

Then again, if facts can be properly gathered and distributed, men in a similar business will understand each other because every normal man wants to understand and act decently in any human relationship. Again, almost any human or business problem can be solved if those affected by it are reasonable and sensible and get together in one room to talk it over.

Don't Believe Rumors

Two wrongs never made a right. Therefore, whether knowingly or unknowingly, willfully or unwillfully, if a member breaks even one of the smaller tenets of an Association, that is no excuse for another member to do so, but rather an opportunity of treating with that particular member, or firm, on a heart-to-heart basis, so that some sensible procedure can be worked out which will carefully point out the inherent fallacy of such transgressions. All of this leads to better personal, moral and financial understandings. Then again, the policy of arbitration is so useful, if properly construed, that there should be fair and impartial findings based on facts, and not on hearsay or innuendo, which is so prevalent in competition.

Standards of Quality as a Basis for Costs

Another big point in favor of cost-finding on a stabilized basis are the new standards for electroplating, which have been so carefully and conscientiously worked out with your help and that of the American Electro-Platers' Society in conjunction with the American Society for Testing Materials and the Bureau of Standards of our Government. Here is a yardstick at least to measure your maximum and minimum costs per pound of good plating, or per square foot of good plating. There is, I believe, a peg around which you can hang your hat and be happily at home.

"Cooperative Courage"

Many associations are ineffective because they lack the maintenance of a fighting spirit. I am using a new word in stating that what is needed greatly in an Institute, or an Association such as yours, is "cooperative courage." We find so little courage applied collectively. Individually, yes, much courage. Sometimes, courage that fights windmills and destroys competition at the expense of profits and a lowering of standards; but cooperative courage, rarely, because of varying ideas rather than cooperative effort.

Create a Demand From the Public

The finances of an Association are important for more than just the carrying on of Association activities. How many realize the vast amount of cooperative effort spent by such associations as the Copper Association, the Zinc Association, the Paint Association and other groups who have constantly maintained a policy of letting the public know the facts about their industry, new uses for their products and better adaptation of their various lines to existing problems. When and where have we found a collective effort to increase the knowledge of the public in general about plating and coating articles. Showing the importance and benefit of coating with metals, as against other materials, should certainly prove a business getter. The general public should know of the important advantages which you gentlemen render by beautifying and protecting metals. No one is able to do this individually because of the cost involved, but collectively either by small monthly pamphlets or small local advertising, or broad general advertising, you create first interest, then a demand and then customers.

Finally, support your association and its officers and members to the fullest extent possible, so that it will thrive and be prosperous and vigorous in all of its branches. Never forget that "he who serves best, profits most."

Removing Antimony

Q.—We desire to reduce the antimony content in ingot red brass.

A.—One of the methods that the writer used to remove antimony from red brass is to make a flux of:

Silica sand	44.5%
Copper oxide	12.5
Iron oxide	1.8
Manganese dioxide	40.7

Mix well and use one to two pounds to the hundred. Stir the metal well and cover with litharge-oxide of lead. Let it stand for a short time, then rabble or pole the metal and cover lightly again with the litharge. Then skim the metal.

I have found this method will remove the antimony. This work, however, is best done in the reverberatory or open flame furnace and after your regular process of refining has been completed. This process is meant to remove the small amount that is not removed by heat and oxidation.—**Master Founder.**

Testing Materials Society Meeting

New Officers Elected. Committee Reports and Technical Papers. Exhibit of Apparatus. Tentative Plating Specifications Approved.

THE American Society for Testing Materials held its Thirty-Eighth Annual Meeting in Detroit, June 24-28. New officers were elected as follows:

President: (Term—one year).

H. S. Vassar, Laboratory Engineer, Public Service Electric and Gas Company, Irvington, N. J.

Vice-President: (Term—two years).

A. E. White, Professor of Metallurgical Engineering, and Director, Department of Engineering Research, University of Michigan, Ann Arbor, Mich.

Members of Executive Committee: (Term—two years).

W. H. Graves, Chief Metallurgist, Packard Motor Car Company, Detroit, Michigan.

R. L. Hallett, National Lead Company, 105 York Street, Brooklyn, N. Y.

N. L. Mochel, Metallurgical Engineer, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa.

H. H. Morgan, Manager of Rail & Track Fastenings Dept., Robert W. Hunt Company, Insurance Exchange Bldg., Chicago, Ill.

W. R. Webster, Chairman of the Board, Bridgeport Brass Company, Bridgeport, Conn.

L. B. Tuckerman Delivered Edgar Marburg Lecture on Aircraft: Materials and Testing

Dr. L. B. Tuckerman, Assistant Chief, Division of Mechanics and Sound, and Principal Scientist, National Bureau of Standards, delivered the Tenth Edgar Marburg Lecture. This lecture which is delivered at the A. S. T. M. annual meeting each year commemorates the name of the Society's first Secretary-Treasurer, who through his development of technical programs over a period of sixteen years, brought wide recognition to the Society as a forum for the discussion of engineering materials subjects.

Dr. Tuckerman, who has done considerable work on technical problems pertaining to the airplane and airship fields, chose the subject: "Aircraft: Materials and Testing." After a brief review covering the development of the structural design of modern aircraft, pointing out the controlling influence of the demand for a light-weight structure, he discussed the relationship between mechanical properties of structural materials and the shape of the structural elements which determine the straight-weight characteristics.

Following a discussion of the development of two types of materials which meet the demands of light-weight metallic construction: (1) relatively high-strength light-weight alloys, (2) extra high-strength ferrous alloys, he pointed out the relationship of the mechanical properties of such alloys to their use in aircraft structures. Doctor Tuckerman plans to make some approach to the subject of influence of aircraft design upon other construction fields.

Exhibit of Apparatus

In addition to interesting displays by leading companies in the industry, the Exhibit of Testing Apparatus and Related Equipment featured special instruments and apparatus as developed by A. S. T. M. committees and various research laboratories.

In the booths of the companies producing and distributing instruments, laboratory supplies, etc., there were items of interest to many engineering materials fields, including non-ferrous metals.

Equipment which was shown was for use in making physical, chemical, electrical, metallographic and spectrographic investigations of materials. Laboratory glassware and metalware, pyrometers, balances, technical books and publications will be included.

Committee Exhibits

Displays by Society committees and research laboratories of special apparatus and equipment they have developed formed an interesting section of the Exhibit. A. S. T. M. Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys had an extensive display showing many corroded specimens which were collected from the various test racks throughout the country. The display covered the committee's work in atmospheric, galvanic and electrolytic and liquid corrosion.

Committee B-6 on Die Cast Metals and Alloys illustrated in its booth important phases of its work. There were a number of samples of test specimens from various alloys, an extensive display of corrosion specimens which the committee has had under test for many years with records of corrosion progress at the various exposure points and an extensive series of sample die castings of various alloys.

The Society's Committee on Metallography illustrated the type of work in its jurisdiction and a large number of photographs, etc., were shown.

An unusual display of standard test specimens as required for various materials in the A. S. T. M. standard specifications and test methods is being developed by the Detroit Committee on Exhibits. This working display was of special interest to technologists in the testing field.

Annual Meeting Features of Wide Interest

The many technical papers and reports which were given in the fifteen sessions of the A. S. T. M. annual meeting will be of much interest. Two features of unusually widespread appeal were planned. The first of these held on Tuesday night, June 25, consisted of a Symposium on the Place of Materials in Automobile Roads and Rides. One of the three papers under this Symposium was **The Car,** by **O. T. Kreuser,** Director, Museum of Science and Industry, Chicago.

Another session of interest was scheduled for Wednesday evening on the subject: The Relationship of Materials to the House of Today and Tomorrow which included the paper, The Role of Materials in Modern Housing by J. E. Burchard, Vice President, Bemis Industries, Inc.

Committee Reports and Papers

Electroplating Specifications

Report of Committee A-5 on Corrosion of Iron and Steel. F. F. Farnsworth, Chairman.

Tentative new specifications covering electrodeposited coatings of zinc on steel, of cadmium on steel, and of nickel and chromium on steel. (See pages 250-255 of this issue).

The Hardness Testing of Light Metals and Alloys. R. L. Templin, Aluminum Company of America.

The application of hardness tests, which have attained so much success with ferrous metals, to general classes of commercial light alloy products. The effects of factors such as load-penetrator-time relationships, anvil or support, size and preparation of specimen, and relationships between different kinds of hardness and between hardness and the other static properties of the light alloys are quantitatively different from those obtained in ferrous metals.

Report of Committee D-14 on Screen Wire Cloth. J. R. Freeman, Jr., Acting Secretary.

Extensive report on atmospheric corrosion tests on seven compositions of non-ferrous screen wire cloth.

Paper appended:

"Atmospheric Exposure Tests on Non-Ferrous Screen Wire Cloth," by G. W. Quick, National Bureau of Standards, presenting a summary of the essential details and results of the exposure tests after approximately nine years at four test locations.

Corrosion Testing Methods. H. E. Searle and F. L. La Que, The International Nickel Company.

The methods of equipment developed and used by the Development and Research Department of The International Nickel Company, Inc., in the investigation of corrosion problems in the field and in the laboratory. The usefulness of each type of corrosion test and their inter-connection and presents data showing the accuracy with which performance in service may be predicted.

The Control of Corrosion in Air-Conditioning Equipment by Chemical Methods. C. M. Sterne, Metropolitan Refining Company, Inc.

The problem of corrosion in air-conditioning equipment based on actual observations by the author in over 200 separate air-conditioning systems, handling both comfort and industrial conditioned spaces in many types of industry and in various cities throughout the United States. Results of corrosion tests run in many of these systems using various forms of chemical treatment; discusses these individual treatments as to their chemical constituents and their relative efficiencies.

Some Tests on Tin Bronzes at Elevated Temperatures. J. W. Bolton, The Luckenheimer Company.

Results on creep tests and study of embrittlement characteristics recently conducted on the A. S. T. M. alloys specified as steam or valve bronze sand casting (B 60) and as sand castings of the alloy: copper 88 per cent, tin 8 per cent, zinc 4 per cent (B 61) by methods conforming to the new testing methods of the Society, at temperatures of 500, 550 and 600 F. The paper is confined to the presentation of data, as the equipment has already been described. Shows detrimental influence of eutectic on elevated temperature properties and suggests limiting temperatures and design stresses for these alloys.

Creep Characteristics of Aluminum Alloys. R. R. Kennedy, U. S. Army Air Corps, Wright Field.

The creep characteristics at 400 and 600 F. of nine aluminum alloys which have been used or proposed for use at elevated temperatures. Sand-cast aluminum-copper-nickel-magnesium alloy has the best creep characteristics of the alloys tested, and some of the newer wrought and cast alloys were markedly inferior to this alloy in this respect, although their mechanical properties at room temperature were superior in some cases and they have better casting and forging properties.

High-Speed Fatigue Tests of Several Ferrous and Non-Ferrous Metals at Low Temperatures. W. D. Boone and H. B. Wishart, University of Illinois.

Results of tests made with two cantilever fatigue machines using 12,000 r.p.m. series motors to determine the endurance limits of cold-drawn steel, rail steel, gray cast iron, mehanite (alloy cast iron), duralumin, and brass using standard and notched fatigue specimens for temperatures of +80 F., +10 F., —20 F., and —40 F. In general the endurance limits increased with decrease in temperature. The stress concentration factors determined by the notched specimens showed no consistent change.

Symposium on Spectrographic Analysis.

Spectrographic methods of analysis have been in use for sufficient time in certain laboratories to establish their reliability as a means for inspecting various materials to determine whether or not they meet specifications as to composition. This is particularly true in the case of zinc and other metals, in the analysis of which the spectrographic method has outstanding advantages. Subcommittee III of Committee E-2 submitted in preliminary draft form proposed Standard Methods for the Quantitative Spectrochemical Analysis of Zinc for Lead, Iron and Cadmium, of Zinc Die-Casting Alloys for Minor Constituents, and Impurities, and of Pig Lead for Copper, Bismuth, Silver, and Nickel. These were opened to discussion in anticipation of their formal submission next year as official tentative standards.

The following papers were presented describing the

methods and details of procedure that have been found applicable to the analysis of other non-ferrous metals.

The Use of the Spectrograph in the Platinum Industry. H. E. Stauss, Baker and Company, Inc.

Quantitative Spectrographic Analysis of Magnesium Alloys for Manganese and Silicon. J. S. Owens, The Dow Chemical Company.

The Spectrographic Determination of Impurities in Commercial Cadmium. Frances W. Lamb, Bohn Aluminum and Brass Corporation.

Report of Committee B-1 on Copper Wire. J. A. Capp, Chairman.

Revisions in the standard specifications for bare concentric-lay copper cable (medium, hard or soft), providing for tests of completed cable and inclusion of new stranding table. Tentative revision of the standard specifications for trolley wire to provide requirements for a higher conductivity trolley wire. Brief resume of activities of subcommittees, including a progress report from the subcommittee on electrical transmission wire and cable specifications.

Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. C. H. Mathewson, Chairman.

Two new tentative specifications for wrought phosphor bronze and for wrought silicon bronze bearings and expansion plates for bridges and structures, and a specification for copper-silicon alloy wire for general purposes.

Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. Sam Tour, Chairman.

New tentative specifications for aluminum die-casting alloys in ingot form. Minor revisions in several existing specifications for aluminum wrought alloys.

Report of Committee B-6 on Die-Cast Metals and Alloys. J. R. Townsend, Chairman.

New tentative specifications for lead- and tin-base alloy die castings. Results of physical tests of specimens after 5-year outdoor exposure, also an extensive report on investigation of the aluminum die-casting alloys. Reports on studies of the finishing of die castings.

Report of Committee B-2 on Non-Ferrous Metals and Alloys. R. F. Mehl, Chairman.

Proposed specifications for lead-coated copper sheets, previously published as information. Tentative revisions of the standard specifications for slab zinc (spelter). Adoption as standard of the specifications for pig lead.

A Survey of Testing in the Precious Alloy Field with Special Reference to Testing Requirements for Duplex Alloys. T. A. Wright, Lucius Pitkin, Inc.

Those items to which tests are or should be applied, and the types of tests required for the more important precious metals. Data in an attempt to lay the foundation for the standardization of tests of gold-plated articles, commonly known as gold-filled and rolled-gold plate.

Making and Testing Single Crystals of Lead. B. B. Betty, University of Illinois.

Creep characteristics of specimens composed of only one crystal to eliminate the effect of movement of grain boundaries, which together with the deformation of the grains themselves appear to determine the creep in polycrystalline lead. The method of casting the crystals; a discussion of the temperature and temperature gradient control necessary. An inexpensive, rapid and sufficiently accurate method of determining the crystallographic orientation of the crystals without the necessity of laborious and time-consuming X-ray method. Results of an actual creep test of a specimen identifying planes of slip with definite crystallographic planes, known as octahedral planes.

Removing Slag

Q.—We use an open flame melting furnace, brick-lined, the tilting type, barrel shaped, with oil burner at either end. We melt an alloy about 85 copper, 5 lead, 5 zinc, 5 tin, virgin metal excepting about 30% which is turnings of the same alloy. Our difficulty lies in the formation of slag on the interior of the furnace which we find increases as we increase the amount of turnings in the mix. This slag in the molten form is sticky and cannot be scraped out except in small amounts. When the slag is cold, it is a stone-like substance, very brittle, copper colored, with gas holes and shot particles of bronze. We are consulting you in this matter feeling that perhaps other foundries have had similar experience and that you may know of some ready method of removing the slag; perhaps a scavenging compound of some sort could be introduced into the furnace, after the metal is poured, to liquefy the mass and make it more easily removed.

A.—You can make up a scavenger that will clean your furnace and keep it clean with a glaze on the side walls.

Take:	85% coke dust
	10% lime
	5% fluorspar

Mix well and add a shovel just before charging your metal. However, the furnace must be hot. This will keep it clean. To clean the furnace after you have drawn the metal from the furnace add two shovels of this mixture and run the furnace for about fifteen minutes. This should clean the furnace and leave it with a glaze.

However, your trouble of making such slag should be removed. If you will analyze this slag you will find it contains considerable metal; I have seen it run as high as 10%. The trouble is in the combustion. The metal oxidizes and turns into slag. This can all be corrected by any one familiar with melting in the open flame furnace.

However, the scavenging mixture given will help keep your furnace clean. In the meantime we suggest you have someone check up on your equipment to see if the slag oxidization cannot be eliminated. —**Master Founder.**

Specifications for Quality of Plated Coatings

Approved by the Master Electro-Platers Institute of the United States

THE Quality Specifications adopted by the Master Electro Platers Institute of the United States at their Second Annual Meeting at Bridgeport, Conn., on June 8-9, 1935, are the outgrowth of years of scientific study conducted by the American Society for Testing Materials and the American Electro Platers Society, assisted by the United States Bureau of Standards.

The study involved more than 11,000 field and laboratory tests so located as to determine the effect upon plating of different atmospheric conditions. The joint Committee of these two organizations, chairmanned by William Phillips of the General Motors Corporation, was composed of representatives of some of the largest manufacturers of metal products in the country.

Although the Quality Standards just adopted by the Master Electro Platers Institute are based upon the scientific data available through the activities already outlined, they include some types of plating upon which the ASTM, AES and United States Bureau of Standards are still making exhaustive tests. The Institute's Committee on Standards of Quality will cooperate with the joint Committee of those two organizations so that the Industry's Standards will never be at variance with the actual findings of those bodies.

The recent action of the Institute approving the Standards which are reported upon pages 251 to 255 of this issue of **Metal Industry,** is an outgrowth of the Electro Plating Industry's efforts to secure code control of fair trade practices. When the Industry adopted a Code of Fair Practices last summer, it undertook to seek acceptance of Quality Standards by the members of the Industry.

To accomplish that objective the Industry's Code Authority appointed the Quality Standards Committee of the Master Electro Platers Institute as the Committee for the entire job plating industry, inviting Dr. William Blum of the National Bureau of Standards to act as Government Representative upon the Committee and Carl Heussner of the Chrysler Corporation, as Consumer Representative.

There followed in quick succession the formulation of the Standards as reprinted on pages 251 to 255 of this issue of **Metal Industry,** their approval by the Supplementary Code Authority for the Electro Plating Industry, their tentative approval by NRA pending an educational program which was projected by the Code Authority through its Code organization and pending also subsequent submission to the members of the Industry for adoption; and finally, their formal adoption by the Master Electro Platers Institute of the United States at Bridgeport, Conn., June 10.

The program for adoption of Quality Standards by the Electro Plating Industry, contemplated under the Code, is no longer feasible, it is said, with the termination of the Code organization. However, the Master Electro Platers Institute will advocate the adoption of the Standard Specifications by its members. It will also promote their universal acceptance and recognition by the members of the job Electro Plating Industry, their customers, the metal industries, and the public, generally.

The members of the Institute will be expected to urge the Quality specified for each type of job as set forth in the approved Standards. Whenever work is performed by members of the Institute which is not of a quality equal to the Standards specified, it will be at the customer's insistence in the face of definite information furnished by the member as to what the approved standards are. The fact that plating required by a customer is not in accordance with the Standards will be clearly set forth upon the member's invoice, if present plans fully materialize, according to M. M. Wise, the president-elect of the Institute, and also Chairman of the Quality Committee.

Mr. Wise added "The Committee on Quality Standards and Specifications of the Institute will continue to function both in devising educational programs which will lead to thorough understanding and wide acceptance of the standards and in cooperating with the ASTM and AES in further development work or in the application of the Standards to the Plating Industry."

The personnel of the Committee is as follows:

M. M. Wise, Chairman, Detroit, Michigan.

H. M. Bell, Cleveland, Ohio.

J. E. Nagle, Toledo, Ohio.

R. J. Nicholson, Chicago, Illinois.

C. S. Slack, Detroit, Michigan.

A. R. Tonon, Cambridge, Massachusetts.

Dr. William Blum, Chemist, Bureau of Standards, U. S. Department of Commerce, Government Representative, Washington, D. C.

Carl Heussner, Chemist, Chrysler Corporation, Consumer Representative, Detroit, Michigan.

The statement below, headed "Introduction" summarizes, concisely, how the members of the Institute will be expected to apply these Standards in actual practice.

Approved Specifications for Quality of Plated Coatings

I. INTRODUCTION:

The standards and specifications herein provided for constitute the approved requirements on all plated work unless otherwise agreed in writing. No member of the Institute shall directly or indirectly make any representation that any work meets these specifications, or that any quotation made on such work is for a quality equal to these specifications unless the requirements herein provided shall be fully complied with.

No such work done by any member of the Institute or any quotation by any member of the Institute on any such work not equal to the requirements herein laid down shall be designated, by any quality mark, or by the emblem of the Institute.

So far as practicable, the requirements for plating not listed in these specifications shall be consistent with those requirements of other trade associations which may adopt standards of plating.

The following specifications cover only the principal types of plating, and the committee will, from time to time, submit to the Executive Committee of the Institue for approval, revisions and additions to these specifications.

June 9th, 1935.

II. APPROVED SPECIFICATIONS FOR ELECTRO-DEPOSITED COATINGS OF NICKEL AND CHROMIUM PLATING:

A. On Steel.

Scope

1. These specifications cover the quality of electroplated coatings on steel with a final finish of either nickel or chromium for articles on which both appearance and protection against corrosion are required.

Two types of coatings are covered; namely,

Type KS—For general service (see Note 1).

Type QS—For mild service.

Manufacture

2. The steel to be plated shall be substantially free from flaws or defects that are detrimental to the final finish. It shall be subjected to such polishing, cleaning, pickling and plating procedures as are necessary to yield deposits with the desired appearance and quality. The use of copper as an initial or intermediate layer is optional, and subject to the requirements in section 3. The coating shall be bright or dull as specified, and shall be adherent and free from blisters, and substantially free from pits or other surface defects.

Thickness of Deposits After Buffing

3. **Type KS.**

(a) **Nickel and Copper.** On significant surfaces of the finished articles the minimum thickness of nickel, or of the combined layers of copper and nickel, shall be not less than 0.00075 inch, and if copper is used, the minimum thickness of the final layer shall be not less than 0.0004 inch.

(b) **Chromium.** If a chromium finish is specified, the minimum thickness of the copper and nickel on significant surfaces shall be as above, and the average thickness of the chromium shall be not less than 0.00002 inch.

4. **Type QS.**

(a) **Nickel and Copper.** On significant surfaces the minimum thickness of nickel, or of the combined copper and nickel layers, shall be not less than 0.0004 inch, and if copper is used, the minimum thickness of the final nickel layer shall be not less than 0.0002 inch.

(b) **Chromium.** If a chromium finish is specified, the minimum thickness of the copper and nickel shall be as above and the average thickness of the chromium shall be not less than 0.00002 inch.

Thickness Measurements. The minimum thickness of the copper and nickel shall be determined by microscopic examination of cross sections taken perpendicular to significant surfaces.

The average thickness of chromium shall be determined by microscopic examination, by stripping methods, or by other methods to be agreed upon.

Salt Spray Test

5. For Type KS the plated articles shall show no appreciable corrosion on significant surfaces at the end of 48 hours continuous exposure to the salt spray test; and for Type QS at the end of 12 hours, conducted in accordance with Note 2.

Unless otherwise agreed upon, "appreciable corrosion" shall be defined as the presence of more than six rust spots per square foot that are visible to the unaided eye, or of any rust spots larger than 1/16 inch in diameter.

6. **Significant Surfaces.** The designation of significant surfaces shall be agreed upon by the parties concerned, and shall be indicated on the drawings.

7. **Sampling.** The number of samples to be tested either originally or subsequent to any failure of the specimens tested initially will depend upon the size of the shipment and shall be mutually agreed upon.

8. Summary:

Minimum Thickness (inch)	Type KS	Type QS
Cu + Ni	0.00075	0.0004
Final Ni	.0004	.0002
Average Thickness (inch)		
Cr.	.00002	.00002
Salt Spray (hrs.)	48	12

Notes

Note 1. Classications. The conditions of exposure and use of plated steel are so varied that it is not possible to predict the average life of articles plated in accordance with Type KS or Type QS, or to predetermine just which type of plating should be speified for a given article. Such a classification must be based upon the experience of the manufacturers and users.

For very long life, or for unusually severe conditions of use, thicker coatings than those of Type KS will be required.

For articles that are intended for only a short period of use, no standard specification for plating is recommended. It is suggested, however, that subject to the prevailing manufacturing conditions, certain minimum requirements be mutually agreed upon in order to insure that the plated coatings render a useful service.

Note 2. Salt Spray Test.

(a) Preparation. The specimen shall be cleaned immediately before insertion in the salt spray, so that the surface is free from "water break". This may be accomplished by any efficient method, such as cleaning with a suitable organic solvent, followed by light rubbing with a cream of pure magnesium oxide.

(b) Operation. The test shall be conducted with a 20 per cent solution of sodium chloride (specific gravity 1.15) under conditions that produce a dense fog throughout the container, without the spray being blown directly against the specimens. The latter shall be supported by glass or other insulating material. The temperature in the box shall be kept by thermostatic control at 95° ± 5° F. (35° ± 3° C.). (This is about the lowest temperature that can be maintained throughout the year without artificial cooling.)

If different kinds of coating or metal are tested simultaneously in the same box, the solution formed by condensation of the spray should be drained off and not used again. If only one type of material is tested in the box, the salt solution should be replaced after not more than 200 hours use.

Note 3. Time Required for Plating—Any specified average or minimum thickness of plating can be produced consistently only if the current density and time of plating are controlled. Regulation of the voltage is of no value except so far as it produces the desired current density.

The current and time required to produce a certain minimum thickness of any metal will depend upon the shape of the article, the shape and position of the anodes, and the throwing power of the solution. General experience indicates that at least the above mentioned periods will usually be required to produce the specified minimum thickness of 0.00075 inch of nickel plus copper. For complicated shapes, longer periods may be required, which must be determined by trial. When a large number of small articles are plated simultaneously (for example on racks or in barrels) the time of plating must be increased to insure the specified thickness on those articles that receive less than the average current density.

(a) Copper and Nickel—To deposit an average thickness of 0.001 inch of either of these metals in acid baths with 90 per cent efficiency, requires about 21 ampere hours per square foot In the cyanide copper bath only about 10 ampere hours per square foot are required if the efficiency is over 90 per cent. Practically, however, the efficiency in cyanide baths may be only 50 to 70 per cent, so for illustration the above figure of 21 ampere hours per square foot will be retained for all the copper layers.

The losses in buffing may vary from 10 to 20 per cent. If the latter value is assumed for safety, this will necessitate the use of a total of 21+4=25 ampere hours (1500 ampere minutes) per square foot to yield an average thickness of 0.001 inch of copper plus nickel on the finished articles. This is equivalent to a total of one hours' plating at 25 amperes per square foot, 2.5 hours at 10 amperes per square foot, or to a corresponding period for any other current density.

(b) Chromium—In chromium plating, bright deposits are usually produced with a cathode efficiency of about 12 per cent. Under these conditions it requires about 500 ampere minutes per square foot to produce the specified average thickness of 0.00002 inch of chromium. This is equivalent to 5 minutes plating at 100 amperes per square foot, or to 2.5 minutes at 200 amp/sq. ft.

B. On Brass, Bronze and Copper

Scope

1. These specifications cover the quality of plated coatings on brass, bronze or copper with a final finish of either nickel or chromium for articles on which both appearance and protection against corrosion are required.

Two types of coating are covered; namely

Type KB—For general service (See Note 1).

Type QB—For mild service.

Manufacture

2. The metal to be plated shall be substantially free from flaws or defects that are detrimental to the final finish. It shall be subjected to such polishing, cleaning, pickling and plating procedures as are necessary to yield deposits with the desired appearance and quality. The coating shall be bright or dull as specified, and shall be adherent and free from blisters, and substantially free from pits or other surface defects.

Thickness of Deposits After Buffing

3. Type KB.

(a) Nickel—On significant surfaces of the finished articles the minimum thickness of the nickel layer shall be not less than 0.0003 inch.

(b) Chromium—If a chromium finish is specified, the minimum thickness of the nickel on significant surfaces shall be as above, and the average thickness of the chromium shall be not less than 0.00002 inch.

4. Type QB.

(a) Nickel—On significant surfaces the minimum thickness of the nickel layer shall be not less than 0.00015 inch.

(b) Chromium—If a chromium finish is specified, the average thickness of the chromium layer shall be not less than 0.00002 inch.

Thickness Measurements—The minimum thickness of the nickel shall be determined by microscopic examination of cross sections taken at points perpendicular to significant surfaces.

The average thickness of the chromium shall be determined by microscopic examination, by stripping methods, or by other methods to be agreed upon.

5. **Significant Surfaces**—The designation of significant surfaces shall be agreed upon by the parties concerned, and may be indicated on the drawings.

6. **Sampling**—The number of samples to be tested either originally or subsequent to any failure of the specimens tested initially will depend upon the size of the shipment and shall be mutually agreed upon.

Notes

Note 1. Classification—The conditions of exposure and use of plated metals are so varied that it is not possible to predict the average life of articles plated in accordance with Type KB or Type QB, or to predetermine just which type of plating should be specified for a given article. Such a classification must be based upon the experience of the manufacturers and users.

For very long life, or for unusually severe conditions of use, thicker coatings than those of Type KB will be required.

For articles that are intended for only a short period of use, no standard specification for plating is recommended. It is suggested, however, that subject to the prevailing manufacturing conditions, certain minimum requirements be mutually agreed upon in order to insure that the plated coatings render a useful service.

Note 2. Time Required for Plating—Any specified average or minimum thickness of plating can be produced consistently only if the current density and time of plating are controlled. Regulation of the voltage is of no value except so far as it produces the desired current density.

The time required to produce a certain average thickness of deposit will depend upon the conditions of plating; and the time required for a specified minimum thickness will also depend upon the shape of the article, the position of the electrodes, and the throwing power of the solution. The following figures are therefore approximate and are intended only as a rough guide.

(a) Nickel—To deposit an average thickness of 0.001 inch of nickel with 90 per cent efficiency requires 21 ampere hours per square foot.

The losses in buffing may vary from 10 to 20 per cent. If the latter value is assumed for safety, this will necessitates the use of a total of 21+4=25 ampere hours per square foot to yield an average thickness of 0.001 inch of nickel or 12.5 ampere hours (750 ampere minutes) per square foot to deposit an average thickness of 0.0005 inch of nickel on the finished articles. This is equivalent to a total of one hour's plating at 12.5 amperes per square foot, 2.5 hours at 5 amperes per square foot, or to a corresponding period for any other current density.

(b) Chromium—In chromium plating, bright deposits are usually produced with a cathode efficiency of about 12 per cent. Under these conditions it requires about 500 ampere minutes per square foot to produce the specified average thickness of 0.00002 inch of chromium. This is equivalent to 5 minutes plating at 100 amperes per square foot, or to 2.5 minutes at 200 amp. sq. ft.

The current and time required to produce a certain minimum thickness of any metal will depend upon the shape of the article, the shape and position of the anodes, and the throwing power of the solution. General experience indicates that at least 12.5 ampere hours per square foot will usually be required to produce the specified minimum thickness of 0.0003 inch of nickel. For complicated shapes, longer periods may be required, which must be determined by trial. When a large number of small articles are plated simultaneously (for example on racks or in barrels) the time of plating must be increased to insure the specified thickness on those articles that receive less than the average current density.

C. On Zinc and Zinc-Base Die-Castings

Scope

1. These specifications cover the quality of plated coatings on zinc or zinc-base die castings with a final finish of either nickel or chromium for articles on which both appearance and protection against corrosion are required.

Two types of coating are covered; namely

Type KZ—For general service (See Note 1).

Type QZ—For mild service.

Manufacture

2. The metal to be plated shall be substantially free from flaws or defects that are detrimental to the final finish. It shall be subjected to such polishing, cleaning, pickling and plating procedures as are necessary to yield deposits with the desired appearance and quality. The use of copper as an initial or intermediate layer is optional, and subject to the requirements in section 3. The coatings shall be bright or dull as specified, and shall be adherent and free from blisters, and substantially free from pits, cracks or other surface defects.

Thickness of Deposits After Buffing

3. **Type KZ.**

(a) Nickel and Copper—On significant surfaces of the finished articles the minimum thickness of the final nickel layer shall be not less than 0.0003 inch. If a copper layer is used, the minimum thickness of copper shall be not less than 0.0003 inch.

(b) Chromium—If a chromium finish is specified, the minimum thickness of the copper and nickel on significant surfaces shall be as above and the average thickness of the chromium shall be not less than 0.00002 inch.

4. **Type QZ.**

(a) Nickel and Copper—On significant surfaces the minimum thickness of the final nickel layer shall be not less than 0.00015 inch.

If a layer of copper is used, the minimum thickness of copper shall be not less than 0.0003 inch.

(b) Chromium—If a chromium finish is specified, the thickness of copper and nickel shall be as above and the average thickness of the chromium layer shall be not less than 0.00002 inch.

Thickness Measurements—The minimum thickness of the copper and nickel shall be determined by microscopic examination of cross sections taken at points perpendicular to significant surfaces.

The average thickness of the chromium shall be determined by microscopic examination by stripping methods or by other methods to be agreed upon.

5. Significant Surfaces—The designation of significant surfaces shall be agreed upon by the parties concerned, and may be indicated on the drawings.

6. Sampling—The number of samples to be tested either originally or subsequent to any failure of the specimens tested initially will depend upon the size of the shipment and shall be mutually agreed upon.

Notes

Note 1. Classification—The conditions of exposure and use of plated metals are so varied that it is not possible to predict the average life of articles plated in accordance with Type KZ or Type QZ, or to predetermine just which type of plating should be specified for a given article. Such a classification must be based upon the experience of the manufacturers and users.

For very long life, or for unusually severe conditions of use, thicker coatings than those of Type KZ will be required.

For articles that are intended for only a short period of use, no standard specification for plating is recommended. It is suggested, however, that subject to the prevailing manufacturing conditions, certain minimum requirements be mutually agreed upon in order to insure that the plated coatings render a useful service.

Note 2. Time Required for Plating—Any specified average or minimum thickness of plating can be produced consistently only if the current density and time of plating are controlled. Regulation of the voltage is of no value except so far as it produces the desired current density.

The time required to produce a certain average thickness of deposit will depend upon the conditions of plating; and the time required for a specified minimum thickness will also depend upon the shape of the article, the position of the electrodes, and the throwing power of the solution. The following figures are therefore approximate and are intended only as a rough guide.

(a) Copper and Nickel—To deposit an average thickness of 0.001 inch of either of these metals in acid baths with 90 per cent efficiency, requires 21 ampere hours per square foot. In the cyanide copper bath only about 10 ampere hours per square foot are required if the efficiency is over 90 per cent. Practically, however, the efficiency in cyanide baths may be only 50 to 70 per cent, so for illustration the above figures of 21 ampere hours per square foot will be retained for both the copper and nickel layers.

The losses in buffing may vary from 10 to 20 per cent. If the latter value is assumed for safety, this will necessitate the use of 21+4=25 ampere hours per square foot to yield an average thickness of 0.001 inch of copper or nickel on the finished articles. This corresponds to 12.5 ampere hours (750 ampere minutes) each for an average thickness of 0.0005 inch of copper or of nickel. This is equivalent to a total of one hour's plating at 12.5 amperes per square foot, 2.5 hours at 5 amperes per square foot, or to a corresponding period for any other current density.

(b) Chromium—In chromium plating, bright deposits are usually produced with a cathode efficiency of about 12 per cent. Under these conditions it requires about 500 ampere minutes per square foot to produce the specified average thickness of 0.00002 inch of chromium. This is equivalent to 5 minutes' plating at 100 amperes per square foot, or to 2.5 minutes at 200 amp/sq. ft.

The current and time required to produce a certain minimum thickness of any metal will depend upon the shape of the article, the shape and position of the anodes, and the throwing power of the solution. General experience indicates that at least 12.5 ampere hours per square foot for each will usually be required to produce the respective minimum thicknesses of 0.0003 inch of nickel and of copper. For complicated shapes, longer periods may be required, which must be determined by trial. When a large number of small articles are placed simultaneously (for example on racks or in barrels) the time of plating must be increased to insure the specified thickness on those articles that receive less than the average current density.

III. APPROVED SPECIFICATIONS FOR ELECTRODEPOSITS OF ZINC ON STEEL.

Scope

1. These specifications cover the quality of electroplated zinc coatings on steel articles that are required to withstand corrosion and on which a high luster is not required.

Two types of coatings are covered; namely
Type L—For general service (See Note 1).
Type R—For mild service.

Manufacture

2. The steel to be plated shall be substantially free from flaws or defects that will be detrimental to the appearance or the protective value of the coatings. It shall be subjected to such cleaning, pickling and plating procedures as are necessary to yield deposits with the desired quality. The zinc coating shall have a uniform appearance, be adherent and free from blisters and be substantially free from other defects that may affect the protective value of the coatings.

Minimum Thickness of Deposits

3. Type L—On significant surfaces, the minimum thickness of the zinc coating shall be not less than 0.0005 inch.

Type R—On significant surfaces, the minimum thickness of the zinc coating shall be not less than 0.00015 inch.

4. Thickness Measurements—The minimum thickness of the zinc coatings shall be determined by dropping tests, or other methods to be agreed upon.

5. Significant Surfaces—The designation of significant surfaces shall be agreed upon by the parties concerned, and may be indicated on the drawings.

6. Sampling—The number of samples to be tested either originally or subsequent to any failure of the specimens tested initially will depend upon the size of the shipment and shall be mutually agreed upon.

Notes

Note 1. Classificaton—The conditions of exposure and use of plated steel are so varied that it is not possible to predict the average life of articles plated in accordance with Type L or Type R, or to predetermine just which type of plating should be specified for a given article. Such a classification must be based upon the experience of the manufacturers and users.

For very long life, or for unusually severe conditions of use, thicker coatings than those of Type L will be required.

For articles that are intended for only a short period of use, no standard specification for plating is recommended. It is suggested, however, that subject to the prevailing manufacturing conditions, certain minimum requirements be mutually agreed upon in order to insure that the plated coatings render a useful service.

Note 2. Time Required for Plating—Any specified thickness of plating can be produced consistently only if the current density and time of plating are controlled. Regulation of the voltage is of no value except so far as it produces the desired current density.

The average thickness of deposit that is required to produce a specified minimum thickness of deposit will depend upon the shape of the article, the shape and position of the anodes, and the throwing power of the solution. Purely for illustration, it will be assumed that the average thickness will be 50 per cent greater than the minimum thickness. The resultant figures serve only as a rough guide and must be confirmed by trial for the articles concerned.

To deposit 0.001 inch of zinc with high efficiency in either acid or cyanide baths, it requires about 14 ampere hours per square foot. To produce an average thickness of 0.00075 inch (that is, 50 per cent more than the minimum thickness of 0.0005 inch specified for Type L), it will therefore require about 11 ampere hours (660 ampere minutes) per square foot. This is equivalent to one hour's plating at 11 amp/ft^2, or a corresponding period for any other current density. Similarly for Type R, it will require about 3.5 ampere hours (210 ampere minutes) per square foot to deposit an average of 0.00023 inch of zinc (or a minimum of 0.00015 inch).

For complicated shapes, longer periods will be required. When a large number of small articles are plated simultaneously (for example, on a rack or in a barrel), the time of plating must be increased to insure the specified thickness on those articles that receive less than the average current density.

IV. APPROVED SPECIFICATIONS FOR ELECTRODEPOSITS OF CADMIUM ON STEEL.

Scope

1. These specifications cover the quality of electroplated cadmium coatings on steel articles that are required to withstand corrosion and on which a high initial luster may be required.

Two types of coatings are covered; namely
Type N—For general service (See Note 1).
Type T—For mild service.

Manufacture

2. The steel to be plated shall be substantially free from flaws or defects that will be detrimental to the appearance or the protective value of the coatings. It shall be subjected to such cleaning, pickling and plating procedures as are necessary to yield deposits with the desired quality. The cadmium coating shall be bright or dull as specified, be adherent and free from blisters and be substantially free from other defects that may affect the appearance or protective value of the coatings.

Minimum Thickness of Deposits

3. **Type N**—On significant surfaces, the minimum thickness of the cadmium coating shall be not less than 0.0005 inch.

Type T—On significant surfaces, the minimum thickness of the cadmium coating shall be not less than 0.00015 inch.

4. **Thickness Measurements**—The minimum thickness of the cadmium coatings shall be determined by dropping tests or other methods to be agreed upon.

5. **Significant Surfaces**—The designation of significant surfaces shall be agreed upon by the parties concerned, and may be indicated on the drawings.

6. **Sampling**—The number of samples to be tested either originally or subsequent to any failure of the specimens tested initially will depend upon the size of the shipment and shall be mutually agreed upon.

Notes

Note 1. Classification—The conditions of exposure and use of plated steel are so varied that it is not possible to predict the average life of articles plated in accordance with Type N or Type T, or to predetermine just which type of plating should be specified for a given article. Such a classification must be based upon the experience of the manufacturers and users.

For very long life, or for unusually severe conditions of use, thicker coatings than those of Type N will be required.

For articles that are intended for only a short period of use, no standard specification for plating is recommended. It is suggested, however, that subject to the prevailing manufacturing conditions, certain minimum requirements be mutually agreed upon in order to insure that the plated coatings render a useful service.

Note 2. Time Required for Plating—Any specified thickness of plating can be produced consistently only if the current density and time of plating are controlled. Regulation of the voltage is of no value except so far as it produces the desired current density.

The average thickness of deposit that is required to produce a specified minimum thickness of deposit will depend upon the shape of the article, the shape and position of the anodes, and the throwing power of the solution. Purely for illustration, it will be assumed that the average thickness will be 50 per cent greater than the minimum thickness. The resultant figures serve only as a rough guide and must be confirmed by trial for the articles concerned.

To deposit 0.001 inch of cadmium with high efficiency, it requires about 10 ampere hours per square foot. To produce an average thickness of 0.00075 inch (that is, 50 per cent more than the minimum thickness of 0.0005 inch specified for Type N), it will therefore require about 7.5 ampere hours (or 450 ampere minutes) per square foot. This is equivalent to one hour's plating at 7.5 amp/ft^2 or a corresponding period for any other current density. Similarly for Type T, it will require about 2.5 ampere hours (150 ampere minutes) per square foot to deposit an average of 0.00023 inch of cadmium (or a minimum of 0.00015 inch).

For complicated shapes, longer periods will be required. When a large number of small articles are plated simultaneously (for example, on a rack or in a barrel), the time if plating must be increased to insure the specified thickness on those articles that receive less than the average current density.

EDITORIALS

How It Was Done — In Bridgeport

THE subject of this song of praise is the American Electro-Platers' Society and its convention, held in Bridgeport, Conn., June 10-13. Moreover, the praises cannot be sung in a few words. The activities, the innovations, the new records set were too numerous to be lumped together and covered by a phrase. Hence this extended eulogy.

First of all, congratulations and hearty handshakes to Ray O'Connor, and his General Committee. Then to the Society as a whole, warm commendation for two very important steps taken at the business meeting: first, the adoption of the specifications for plating on steel; second, the admission of assistant foremen platers to associate membership in the Society.

But there are many others to be congratulated. There is the Bridgeport Branch which won the first leg on the cup given by **Metal Industry** for the best exhibit of electroplated work by any of the Branches. There is the Hanson-Van Winkle-Munning Company, who had the brilliant idea of circulating a daily newssheet, which not only added to the visitors' enjoyment, but was really helpful in keeping them informed. There is W. M. Phillips, who was awarded the Founders Gold Medal—and never a better award was made. And last, but not in any way the least, there are congratulations due to George Hogaboom and the Papers Committee for a program, which has overtopped every previous convention.

How the American Electro-Platers' Society has grown in stature was never so plain as at these meetings. The chemist and the technical man were present in full force, as well as practical platers. For example at the meeting on Tuesday evening, June 11th, more than 500 were present to listen to the explanations of microscopic measurements, x-rays, spectrographic analysis and exploratory electrodes. The last paper was offered at 11:30 P. M. and everyone stayed until the close of the meeting, 12:15 A. M. There is not a technical or scientific organization anywhere which could have bettered that record.

The practical plater has his work cut out for him. He has the choice of being bewildered, dropping behind and finally dropping out of the picture, or of buckling down to work and keeping abreast of the times. To complain about "highbrow" papers without making an attempt to understand them, is to drop behind and this spells danger. Electroplating is rapidly changing from an art to a science, and electroplaters must move with it or be lost.

To the manufacturers in New England, this convention was a revelation. Many of them still thought that the American Electro-Platers' Society was a sort of union; that its educational features were secondary. But their eyes were opened by the nature of the meetings, which were strictly technical and educational in character, and by the exhibition of electroplating equipment and supplies and electroplated products, which was strictly business. There has never been a platers' convention with so many executives as visitors.

The 1936 convention will be held in Cleveland. It is an honor but it is also a man-sized job. Bridgeport has left Cleveland a high mark to shoot at.

Quality Plate

AT THE meeting of the Master Electro-Platers Institute, reported on page 243 of this issue, one note was struck by Maxwell M. Wise, the new president, which will bear repeating and repeating and repeating. The Institute Stands For Quality Plating.

There are sound practical as well as idealistic reasons for this stand. To be sure we all want our industry to be respected, just as every individual wants to be respected. But it is not for respect in the abstract that the Institute stands for quality. It is because without standards of quality, the job plating industry will fade out of the industrial picture. Users of plating will put in their own plants or turn to other finishes.

We now have specifications for plating on steel, adopted as tentative by the American Society for Testing Materials and approved definitely by the M.E.P.I. This is a fine foundation on which to build a tall structure. It must be followed first by other specifications; then by selling the program to the plating industry; and last and most important, the advantages of quality plate must be brought home to consumers as a whole. Urge manufacturers to call for specification plating. Teach them the value of quality in their product. Get them to sell their products to the public on the basis of that quality. In the meantime the plating industry will rise to these demands and find for itself a very pleasant place in the sun.

Voluntary Cooperation

LATE in May, by a unanimous decision, the United States Supreme Court swept the N. R. A. out of existence by ruling the Act under which it was formed, unconstitutional. Within a few days all code enforcement activities ceased, and code authorities were dissolved. Immediately thereafter, however, trade associations came out from the background and began immediately to resume leadership which had been taken from them by code authorities. Moreover, industry after industry—steel, textiles, copper, copper fabrication and many others, voted to maintain voluntarily, the conditions of labor, and as far as possible, all trade practices set by their codes.

Necessarily, there was and still is, much confusion. Some price-cutting immediately showed its head, and some cancellations were felt. But in the main, what happened was not backsliding, but hesitation.

A new Act has been passed, setting up a curtailed and skeletonized N. R. A., which would not be un-

constitutional. What it will do, how it will operate, how long it will live, no one knows.

Coming as it does at a time of seasonal recession in business, the elimination of the N. R. A. may intensify this recession. But there is a fairly general feeling that this state may be only temporary. Industry in general is standing fast. There seems to be every desire to avoid breaking down the good elements of the codes, and industry seems to be willing to go ahead co-operatively and voluntarily, where in many cases it was unwilling to be coerced.

Co-operation of this character can be effective only through trade associations and it is, therefore, in associations that hope now rests, of maintaining standards, lessening the terrors of unrestrained competition, and making business a fair game instead of a free-for-all-fight with no holds barred.

Shortage of Skilled Workers

IN A study just completed by the National Industrial Conference Board, a shortage was reported of 1,193 skilled craftsmen among 287 metal manufacturing companies who employed 115,260 workers. The Board estimates that at this time there is a shortage of over 19,000 skilled workers, and that if industry were to resume normal operations very shortly, the shortage of such workers would be increased to over 123,000. This rather surprising situation has been attributed to the following:

1. The tendency to train single machine operators in place of all-around mechanics.
2. Skilled craftsmen have abandoned industry to go into other occupations.
3. Deterioration in skill of the workers through prolonged unemployment.
4. Suspension of apprenticeship programs, resulting in failure to make up the losses due to mortality, etc.

Other reasons are given but the above are easily the most important. Of special importance is No. 4.

Industrial employers as a whole are unanimous that the real solution of the problem is the establishment of a comprehensive and efficient system of apprentice training. The apprentice must have the opportunity of getting an all around mechanical training, the prospect of satisfactory earning power, stability of employment and an opportunity for advancement. A standardized and coordinated effort on the part of industry is essential.

The Government is also aware of this situation as evidenced by the talk on apprentice training made by William F. Patterson, executive secretary of the Federal Committee on Apprentice Training at the last convention of the American Foundrymen's Association. This Committee has undertaken the problem of fostering apprenticeship programs throughout all industry. The American Foundrymen's Association has also set up standards of four-year apprenticeship programs in the foundry which are practically ready for use by any organization in a position to take on apprentices.

It takes time to plan any such program; it takes more time to put it into operation. It takes most time, however, before the program which is in effect, can show tangible results. Far-seeing foundry executives will understand that this program is not for to-morrow or next year, but for the next five or ten years, but that without adequate preparation at this time, we are sure to be confronted with a very unhappy situation—inability to produce because of inadequate labor.

Size Versus the Costs in Foundries

ONE of the advantages of organization in industry is the possibility of collecting trustworthy statistics, which will be a guide to intelligent operators. The recently issued circular No. 25 of the Non-Ferrous Foundry Industry Code Authority gives us some very interesting figures on the extent of the industry and the situation in the plants themselves.

It seems that there are about 1300 foundries doing jobbing work in non-ferrous castings, which employ a total of about 10,700 workers, and do a total business of about $40,000,000 annually. For purposes of comparison they have been divided into three classes: Class A, doing $70,000 per year and up; Class B, $10,000 to $70,000 per year; Class C, doing up to $10,000 per year. The class A plants average about $240,000 per year; Class B, $29,000 and Class C, $4,000.

Class A paid the highest rate of wages (63.7c. per hour average), ranking second in the production of pounds of castings per man hour (7.3), got the highest prices for its work, had the lowest percentage of payroll to sales (30.9), and consequently paid its employees more and showed the best margin of profit than any other class. Class B foundries ranked second in rate of pay (62.2c.), were at the top in rate of production (7.79), were second in the prices obtained, second in percentage of payroll to sales (31.2), second in the amount paid to employees and in the margin of profit. Class C had the lowest wage scale (62.1c.), had the lowest production (5.29), got the highest prices, had the highest percentage of payroll to sales (41.2), and therefore disbursed less to its men and had at the same time the lowest margin of profit.

What is the answer? The small shop does small lots, gives a high degree of individual attention and service to small jobs. Consequently its labor costs are high and its prices should be even higher than they are. Why are they not high enough? Because the typical small founder does not know what it costs him to provide this intensive service.

There is nothing more true than one short sentence which appeared in this report.

"Many of the figures showed a very evident need for more general use of the cost system."

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

Carbonates in Brass Solution

Q.—Would like to know which is best to use in a yellow brass solution, carbonate of soda or soda ash, and what would be the result if too much or too little should be added. I am plating gas heater castings and have a 400-gal. tank.

A.—Carbonate of soda and soda ash have the same effect when added to a brass solution. The two chemicals are practically the same, the only difference being the amount of water of crystallization they contain.

By adding either to a brass solution the carbonate content is increased and this is usually not desirable after the solution is made. Problem 5,397.

Chemical Jet Black

Q.—Please tell us how to obtain a jet black finish like that on enclosed sample.

The temperatures used to obtain such a finish should not exceed three hundred degrees F.

A.—The following formula can be used to produce the finish on the sample submitted:

Water	8 ozs.
Chloride of iron	2 ozs.
Mercury chloride	2 ozs.
Muriatic acid	2 ozs.
Alcohol	8 ozs.

Mix the first three ingredients, then add the muriatic acid and alcohol.

Dip the work in this solution and then allow to dry for 12 to 18 hours. Then place in boiling hot water for an hour or so, dry and scratch brush lightly. Repeat the operations and then oil with a light oil such as paraffine oil.

Problem 5,398.

Copper on Aluminum

Q.—Can you please tell me how to plate copper sheet aluminum lamp shades, 12" long.

Will these shades blister, after they are plated, from electric bulbs when in use?

A.—It is possible to plate the sheet aluminum with copper but a deposit of nickel should be placed upon the aluminum before copper plating.

We do not believe that the heat from the electric bulbs would cause the deposit to blister. For the method of nickel plating upon aluminum we refer you to the Aluminum Co. of America, Pittsburgh, Pa. Problem 5,399.

Deficient Copper

Q.—I have an acid copper solution which is giving me trouble. It is in a small tank 30" x 24" x 18", holding about 30 gallons. 1 plate iron and steel parts. Original formula: copper sulphate, 2 lbs.; sulphuric acid 4 ozs.; powdered alum, 1 oz.; water, 1 gal. I want to cover up 120 emery marks in steel bumpers but the polishing marks still show.

A.—Analysis of acid copper solution:

Metallic copper	1.73 ozs.
Sulphuric acid	12.9 ozs.

The solution is in a very poor condition. The metal content is very low and the acid content entirely too high.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: .....**width:** .....**Solution depth:** .....

Anode surface, sq. ft.:.....**Cathode surface, sq. ft:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:**.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

The volume of solution is so small that we would suggest that the solution be discarded and a new one made.

Problem 5,400.

Deficient Silver Solution

Q.—Under separate cover we are sending sample of our silver solution which I would greatly appreciate your advising me of its needs. We are having some difficulty with our plating in that on articles with filigree work there is a tendency to streak.

A.—Analysis of silver solution:

Metallic silver	1.86 ozs.
Free cyanide	2.53 ozs.

The solution is low in both metal and free cyanide. Add to each gallon of solution 1 oz. of silver cyanide and 4 ozs. of sodium cyanide.

After these corrections have been made to the solution, and you still have trouble, then look to the cleaning operation.

Problem 5,401.

General Nickel Solution

Q.—We are sending under separate cover sample of nickel solution with which we are having trouble of pitting; and at times, rough nickel. Please analyze and give pH.

Would you advise putting nickel anodes in muslin bags in order to avoid rough nickel? Please advise quantities to use after you analyze. We use this solution on copper, brass and steel; also we chrome all work.

A.—Analysis of nickel solution:

Metallic nickel	1.86 ozs.
Chlorides	2.06 ozs.
pH	6.4

We would suggest that you add to each gallon of solution 4 ozs. of single nickel salts and 1 cubic centimeter of c.p. sulfuric acid. After making this correction and you still have trouble, add 1 quart of hydrogen peroxide to each 100 gallons of solution.

We would advise filtering of the solution, and then bagging the anodes to prevent rough deposits.

Problem 5,402.

Nickel and Copper

Q.—I am sending samples of nickel and copper solutions for analysis. Enclosed find blank with information. I shall greatly appreciate this.

A.—Analysis of nickel solution:

Metallic nickel	1.74 ozs.
Chlorides	.28 ozs.
pH	5.2

This solution is in a poor operating condition. To replenish the solution it will be necessary to add 6 zs. f single nickel salts, 2 ozs. of sodium chloride, and 2 cubic centimeters of 26° ammonia to each gallon of solution.

Analysis of cyanide copper:

Metallic copper	2.04 ozs.
Free cyanide	.11 oz.

This solution is also in a poor operating condition. Add 1 oz. of copper cyanide and 1½ ozs. of sodium cyanide to each gallon of solution.

Problem 5,403.

Nickel, Copper and Silver

Q.—We are sending samples of our silver strike solution, our silver solution, copper solution and nickel solution. We would appreciate it if you would make an analysis of these solutions, and advise us what we can do to the different solutions to bring them up to standard, or if you would think it best for us to make new solutions, we will do so.

Do you advise leaving our anodes in these solutions when same are not being used, even though some of these solutions may not be used for 2 weeks or longer at a time?

We are manufacturing jewelers of class rings, pins, medals, and belt buckles and do quite a lot of special order work for the jewelry trade.

At times our nickel solution might not be used for a week or two at a time; then we might have occasion for nickel plating a gross of belt buckles or so; then we might run slow again and not use same for a few weeks. Our tank holds 25 gallons and we have 2 anodes 7″ x 9″ and 4 anodes 3″ x 9″. We have been operating this nickel solution on about 2 volts and we find that our work has been coming out dark and is not as smooth as we would like it. This solution, some time ago used to plate very nice and bright.

Our silver solution is in a crock which holds 10 gallons, and the articles we silver strike are mostly small belt buckles about 1½″ sq. and we are having quite a lot of difficulty. After we strike the articles, we scratch brush them with a soft brass brush and quite often this strike peels off on us. Other times it will hold all right, then we will put it in our regular silver solution. After we finish plating same, we scratch brush, and quite often it peels off.

Our copper solution seems to work all right. We have not had any trouble with peeling although it does come out with quite a dark smut. But in scratch brushing it most of this smut comes off. We believe this is almost in a fair condition, but if there is anything we can do to this solution to make it better, we would appreciate the information.

A.—Analysis of nickel solution:

Metallic nickel	1.73 ozs.
Chlorides	1.85 ozs.
pH	6.8

Add 6 lbs. of single salts and 10 fluid ozs. of C. P. sulphuric acid.

Analysis of copper solution:

Metallic copper	3.68 ozs.
Free cyanide	.16 oz.

Add one oz. of sodium cyanide to each gallon of solution. Also, add 1/64 oz. of hyposulphite of soda to each gallon of solution.

Analysis of silver strike solution:

Metallic silver	1.88 ozs.
Free cyanide	5.11 ozs.

Take six gallons of solution from this tank and replenish with water, then add 3½ lbs. of sodium cyanide.

The bottle that was labeled silver solution was broken in transit so if you will send us another sample we will analyze it and advise you accordingly.

The silver anodes are the only anodes that should be removed from the tank if the solution is not used for any length of time.

Problem 5,404.

Removing Soft Solder

Q.—We have frequent requests from refrigeration people to resolder their boilers with silver solder as soft solder disintegrates rather rapidly in brine solution.

Inasmuch as silver solder will not make a real cohesive job if there is a vestige of soft solder present we melt all superfluous solder off with a blow torch and scrape the rest off with reamers, etc.

As this takes quite a while to do, we would appreciate it if you could advise us of a proper strip to take a solder film off of brass and copper parts.

A.—Soft solder can be removed from brass or copper by placing the work that contains the solder in a muriatic acid solution.

The acid should be used concentrated and heated to 180° F. for best results. The length of time necessary to remove the solder will depend upon the amount of solder to be removed.

Problem 5,405.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

Horizontal Edgewise Pyrometer

The Illinois Testing Laboratories, Inc., 420 N. La Salle Street, Chicago, Ill., have designed a new pyrometer for service where accuracy and reliability are needed. Both indicator and switch are water-proof, fume-proof and dust-tight. This pyrometer is called the "Alnor" Horizontal Edgewise Pyrometer and is furnished with selector switch for either 8, 17, 18 and 25 circuits. It can also be furnished without this multi-point switch.

The pyrometer has a range up to 1,000 degrees F., the scale being 6" long with clear, legible markings and a fine pointer and a mirror to eliminate errors in reading.

Other points of interest are: cold end adjustment, exceptionally high internal resistance and perfect damping of the moving element to prevent the pointer from over-swinging or oscillating.

Horizontal Edgewise Pyrometer

New Non-Ferrous Alloy

Two Air Ministry specifications D.T.D. 232 (hard) and D.T.D. 237 (soft) have just been published for a new non-ferrous alloy of nickel, copper, zinc, iron and manganese which has been developed by William Gallimore & Sons, Ltd., of Sheffield, England.

For certain applications the alloy is intended to compete with stainless steel which it resembles, being white in color and can be readily polished. Extensive tests in seawater are said to have shown that there is no corrosion in the metal itself or at the joints made with grade "A" tinman's solder; also that it can be readily machined or cut, and that it will bend and take shapes with ease, although intermediate annealing may be necessary if such manipulation is complicated.

The annealing temperature is about 780° C and the alloy can be quenched in water or air-cooled. Annealing does not cause scaling or have any effect on the surface except to dull, slightly, the polish.

It can easily be soldered and welded, strong joints being made with the usual grade "A" tinman's solder. The electrolytic action set up is negligible. It is not liable to fatigue or season cracking and is one of those "neutral" alloys answering well in conjunction with the lighter alloys such as Duralumin and the various steels.

Compositions are as follows:

D.T.D. 237: (Soft)

Nickel	43-48%
Zinc	21-25%
Iron	2% Max.
Manganese	2% Max.
Impurities	1% Max.
Copper	balance

Tensile strength, 70,000 lbs. per sq. in. Elongation, 25%.

D.T.D. 232 has the same composition as D.T.D. 237, but calls for delivery in the cold rolled condition. Tensile strength 100,000 to 130,000 lbs. per sq. in. Elongation, 12%.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Reinforced Chemical Sheet Lead for Hot Acids. Crawlproof Sheet Lead. National Lead Company, St. Louis, Mo.

Automatic Gun Outfit; for coating the inside of cement-lined pipes with a heavy asphaltum water-proofing material. DeVilbiss Company, Toledo, Ohio.

X-Ray Inspection Equipment for Use on the Production Line. Adrian X-Ray Manufacturing Company, 3535 North Palmer Street, Milwaukee, Wis.

Light-Weight Refractory Concrete. Johns-Manville, 22 E. 40th Street, New York.

DeLuxe Hand-ee Grinder. A light weight, small sized grinder which can be held like a pencil. Chicago Wheel & Manufacturing Company, 1101 W. Monroe Street, Chicago, Ill.

Taylor Reset Controller; for controlling temperature, pressure and rate of flow, and for liquid level applications. Taylor Instrument Companies, Rochester, N. Y.

Laboratory Stirrer; mixing, dissolving, dispersing chemicals, etc. Chemical Publishing Company, 175 5th Avenue, New York City.

Etching Methods

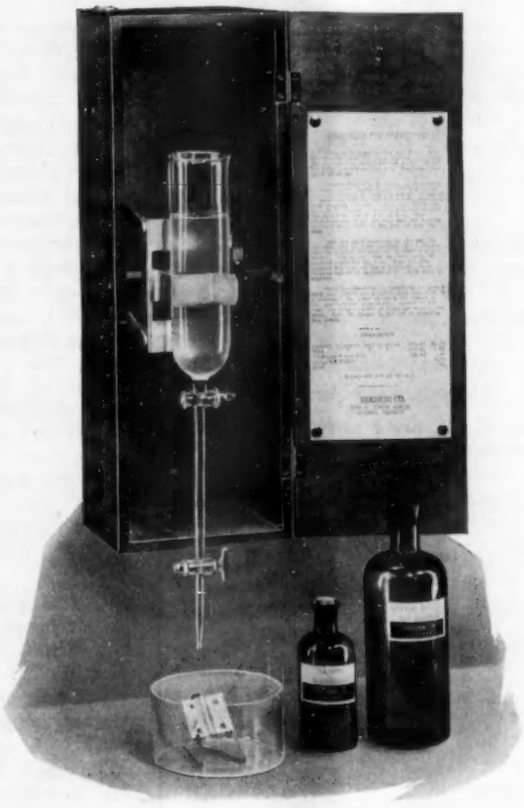
Interesting information concerning etching methods and tools is obtainable from John R. Baynes and Son, Canterbury, Conn. Mr. Baynes has been in the etching industry for the past 35 years, during which time he has developed a number of processes for decorating and marking cutlery, tools of all kinds, steel articles, etc.

This firm is now also manufacturing the "Magic Marker" metal etching inks used for the rapid marking of razor blades, cutlery and steel tools, etc. They also supply instruction in tool marking by the Baynes single varnish flexible steel stamp process of etching and also by the best rubber stamp methods, stain etching, single varnish, double varnish and electric processes.

Analytical Set

An analytical set for the determination of cadmium and zinc deposits by the Hull and Strausser method, has been placed on the market by the Kocour Company, 4724 S. Turner Avenue, Chicago, Ill. This set embodies the principle of the dropping tests, and it is stated, has an average accuracy of better than 95 per cent. The corrosive solution is of such strength that each elapsed second represents 0.00001 inch of deposit.

The set consists of a special dropping funnel, a bottle of solution for cadmium or zinc, a bottle of cleaning medium, and a dish; all packed in a cabinet which serves as a holder for the funnel while making a test and as a dust tight container for the parts when not in use.



Analytical Set for Zinc and Cadmium

Vibratory Screen

A new vibratory screen has been designed by D. S. Paterson of the Paterson Engineering Company and is being distributed by Arthur T. Ward, 50 Church Street, New York. This screen has two main features: (1), the adjustability of the vibration to suit the material; (2), a simple method of holding in the cloths and permitting their quick replacement. The vibratory motion is obtained through the use of a motor driven unbalanced weight and is controlled by adjusting the position of the weight. The motor is hermetically sealed in a dust and explosion proof hood and operates on any lighting circuit.

Sieve cloths are fastened by a unique method which requires no bolts, screws, or holes in the cloth.

The screen is easily portable and, it is stated, can be used for any liquid or solid material.

Mac Dermid Cleaners

In our June issue (advertising page 8), in the description of the cleaners manufactured by MacDermid, Inc., Waterbury, Conn., the third paragraph contained the line "Should you have a problem in the burning of brass parts . . . " This was a typographical error. It should have read " . . . burnishing of brass parts."

Steel Grit

In cleaning metal surfaces for plating or enameling many leading plants have found by comparative tests that steel grit will do the work most rapidly and effectively at lowest cost. While steel shot and other blast abrasives clean by a peaning hammer action which is quite effective in removing molding sand and scale, steel grit adds a cutting action which quickly produces a clean all-metal surface of an open, porous, matte character which is said to be much more satisfactory for plating or enameling than the semi-glaze produced by other blast abrasives.

American Eversharp steel grit is supplied in 10 standard sizes uniformly graded. One of these sizes will be best for each particular purpose, requirements varying with nature of metal, and type of surface desired.

Special analysis metal, chilled, heat-treated, and crushed in a way to produce sharp cutting points and angles, together with uniform grading to size, produces a steel grit that is very effective in action, and that lasts a long time, retaining its unusual cleaning qualities. It is manufactured by The American Steel Abrasives Company of Galion, Ohio, who also manufacture standardized steel shot.

Dry Type Filter

The name "Dry-Matic" has been selected by the Coppus Engineering Corporation of Worcester, Massachusetts, for its new fully automatic, self-cleaning, dry type filter.

This new filter uses a specially woven cotton fabric as the filter medium. When the air passes through this filter material, the dust particles are sifted out and deposited on the filter curtain. Once a day to once a week, according to the dust concentration in the air, the filter curtain starts to move slowly over a dust drawer at the bottom of the filter housing and at the same time a rotary beater is set in operation.

This may be accomplished either manually or automatically whichever best meets the need of the trade. Because of its greater operating flexibility, the manually operated push button is furnished as standard equipment.

Soft leather fringes beat the curtain **on the clean air side** with the result that all dust is shaken off into the dust drawer. After a complete cleaning cycle which lasts from 8 to 15 minutes, according to the height of the filter, the drive motor as well as the beater motor stops automatically. The only attention necessary for this fully automatic operation is the removal of the accumulated dust (which takes but a few minutes) from the dust drawer 3 to 4 times a year.

The Coppus Engineering Corporation claims the following advantages for its Dry-Matic filter:

(1) It is over 99.9% efficient for dust particles of 10 micron size or larger.

(2) It maintains its high cleaning efficiency even if neglected.

(3) The cleaning efficiency is only slightly affected by over or under-rate of air flow.

(4) It has and maintains a very low air resistance.

(5) It is self-cleaning and fully automatic in operation.

(6) It requires little servicing. The emptying of the dust drawer 3 to 4 times a year is all that is necessary.

(7) Its cost of upkeep is negligible.

(8) The air passes through the filter curtain **only once** and cannot, therefore, pick up any dirt **after** it has passed through the curtain.

Acid Proof Cements

The U. S. Stoneware Company, Akron, Ohio, has published an interesting folder on quick-setting, acid-proof cements for acid-proof tank and tower construction (Bulletin 801). They recommend acid-proof masonry for chemical plant construction because of its long life, its great resistance to high heat and quick thermal changes, the high purity of the contents of the material, its resistance to abrasion and the relatively low cost of installation.

The folder also gives practical suggestions on construction, based on the best acid proof lining practice.

Catalogs

Coppus Dry-Matic, Dry-Type Fully Automatic Self-Cleaning Air Filter. Coppus Engineering Corporation, Worcester, Mass. (376)

Norton Diamond Wheels; for grinding and lapping the cemented carbides and hard brittle materials. Norton Company, Worcester, Mass. (377)

Standard Rubber Products. A 56-page general catalog covering various lines such as belting, hose, fittings, packing, friction material, molded goods, sundries and specialties, matting and tread, rubber covered rolls and tanks, abrasive wheels, etc. Manhattan Rubber Manufacturing Division, Raybestos-Manhattan, Inc., Passaic, N. J. (378)

Out of the Realm of Dust. How modern industry controls dust and its by-products. Pangborn Corporation, Hagerstown, Md. (379)

Courses in Chemical and Metallurgical Engineering. University of Michigan, Ann Arbor, Mich. (380)

Resistance Handbook for 1935. Engineering data on electrical resistance wire. Wilbur B. Driver Company, Newark, N. J. (381)

Stainless Steel Treated with Columbium. Electro-Metallurgical Company, 205 E. 42nd Street, New York. (382)

Methods and Equipment for Electro-Plating. Electrolytic treatment, metal cleaning, pickling, acid dipping, drying and allied operations. U. S. Galvanizing & Plating Equipment Corporation, 27-41 Heyward Street, Brooklyn, N. Y. (383)

Seymour Controlled Grain Anodes. A comprehensive catalog devoted to anodes. Seymour Manufacturing Company, Seymour, Conn. (384)

Air Tight Blast Gates. Catalog 351. W. S. Rockwell Company, 50 Church Street, New York. (385)

Rod Straightening and Shearing Machine. American Foundry Equipment Company, Mishawaka, Ind. (386)

Bentonite. A colloidal clay. American Colloid Company, 363 W. Superior Street, Chicago, Ill. (387)

The Fallacy of Wage and Hour Controls. No. 12 in a series of booklet-editorials, by A. W. Rucker in collaboration with N. W. Pickering, president, Farrel-Birmingham Company, Inc., Ansonia, Conn. (388)

Piston Replacement. A pamphlet on pistons, cam grinding, "Lo-Ex" alloys and Alumilite. Aluminum Company of America, Gulf Building, Pittsburgh, Pa. (389)

Gas Heated Convected Air Tempering Furnaces. Despatch Oven Company, 622 Ninth Street, S. E., Minneapolis, Minn. (390)

Printing on Master Metal. Reynolds Metals Company, 19 Rector Street, New York. (391)

Thwing's Foundry Visitor. Interesting journeys to interesting foundries. Thwing Instrument Company, 3339 Lancaster Avenue, Phila., Pa. (392)

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

METAL INDUSTRY
116 John Street, New York.

(Insert below the number in parentheses at end of each item desired.)

I wish to receive the following catalogs mentioned in July, 1935

.....

.....

Name ..... Address .....

Associations and Societies

American Foundrymen's Association

222 W. Adams Street, Chicago, Ill.

The 1935 convention of the American Foundrymen's Association will be held in Toronto, Canada, August 20-23, with headquarters at the Royal York Hotel. The tentative schedule of sessions relating to non-ferrous metals is as follows:

Monday, August 19

Committee meetings.

Tuesday, August 20

10 to 11 A. M. Opening meeting.
11 to 1 P. M. Foundry Sand Research.
Afternoon. Plant Visitation.
8 to 9 P. M. Sand Shop Course.

Wednesday, August 21

9 to 11 A. M. Materials Handling and Foundry Equipment.
11 to 1 P. M. Foundry Refractories. Foundry Costs.
Afternoon. Plant Visitation. Golf, Sight-seeing.
8 to 10 P. M. Silicosis and Employer Responsibility.
9 to 10 P. M. Sand Shop Course.

Thursday, August 22

10 to 11 A. M. Sand Shop Course.
9 to 11 A. M. (a) Apprentice Training. (b) Non-ferrous Castings.
1:15 to 3:45 P. M. Round Table Luncheon. (c) Non-ferrous.
4 P. M. Annual Business Meeting.
7 P. M. Annual Dinner and Reception.

Friday, August 23

11 to 1 P. M. (a) Dust Control and Safety Codes. (b) Non-ferrous Founding.
Afternoon. Opening of Canadian National Exposition.

Exchange Paper on Bronzes

The 1935 official Exchange paper of the Institute of British Foundrymen for the annual convention of the American Foundrymen's Association will be presented by A. J. Murphy, a noted British metallurgist. The paper, dealing with High Strength Cast Bronzes, is to be discussed at the non-ferrous session. Mr. Murphy, delegated by the Institute of British Foundrymen to represent them on the Toronto program is Chief Metallurgist for J. Stone and Company, Ltd., engineers and founders of Deptford, London.

Report of 1935 Nominating Committee

Past President E. H. Ballard, Chairman of the 1935 Nominating Committee, has certified to the Executive Secretary that at a meeting of the committee held in Detroit, May 11, 1935, the following officers and directors were duly nominated:

For President, **Dan M. Avey,** Editor, "The Foundry," Cleveland.

For Vice-President, **B. H. Johnson,** Assistant to the President, R. D. Wood Company, Philadelphia.

For Directors to serve three-year terms each:

Henry S. Washburn, President, Plainville Casting Company, Plainville, Conn.

Lamar S. Peregoy, President, Sivyer Steel Casting Company, Milwaukee, Wis.

C. E. Davis, President, Pittsburgh Foundrymen's Association.

W. J. Cluff, President, Frederic B. Stevens, Inc., Detroit, Mich.

Frank A. Sherman, Vice-President and General Manager, Dominion Foundries and Steel, Ltd., Hamilton, Ontario, Canada.

New Mid-West Branch of Electro Platers' Institute Formed

Headquarters, 8735 E. Jefferson Avenue, Detroit, Mich.

Meeting at Indian Lake, Ohio, June 22nd and 23rd eleven member associations of the Master Electro Platers Institute of the United States comprising as many trade areas pooled their efforts in a movement for Quality Plating and pledged their financial and moral support behind an intensive program of education and cooperation in behalf of plating standards.

Letters of commendation and assurance of cooperation were read from manufacturers who expressed intense interest in the efforts being made by this group of job platers to promote specification and quality plating.

Henderson Bell of Cleveland was elected president of the new organization, which will be known as the Master Electro Platers Association of the Mid-West. The organization will be a member of the Master Electro Platers Institute of the United States and will share the headquarters offices with the national organization.

"We in the Mid-West feel" Mr. Bell explained to a representative of **Metal Industry,** "that we are ready for the sort of intensive program which the Institute is prepared to undertake. We are not faced with the expense of maintaining local branch services. We want to apply in our trade areas the more beneficial features of the program which were developed by the Institute during the past year."

"We are in effect engaging the Institute staff on a part-time basis with the addition of the services of a field secretary under the direction of our own Executive Committee to do for us this year what we hope the Institute itself will be in a position to do for all trade areas in the near future. This move on the part of the Mid-West group will not only serve to keep the Institute functioning effectively but will also furnish a **'proving ground'** for its future services to the Industry, nationally."

Committees are at work completing the details of the organization which is already a going concern. **Hugh Booth,** the Executive Secretary of the Institute has been engaged as its Executive Secretary and **C. R. LeClaire** as Field Secretary.

The Offiers and Executive Committee of the Master Electro Platers Association of the Mid-West follow:

President, **Henderson M. Bell,** Cleveland, Ohio.

Vice-President, **John Lockerbie,** Goshen, Indiana.

Treasurer, **Philip Hale,** Toledo, Ohio.

Executive Committee: Henderson Bell, Cleveland Area; Harold Karet, Buffalo Area; Philip Hale, Toledo Area; John Lockerbie, Northern Indiana and Southern Michigan Area; Albert Kriese, Indianapolis Area; W. H. Hartsell, Dayton Area; N. H. McKay, Pittsburgh Area; Robert Reed, Detroit and Michigan Area; Ralph Stolle, Cincinnati Area; J. Zang, Columbus Area; C. Schwartz, Evansville Area.

The new Association plans to hold its second general meeting at Indian Lake on September 14 and 15, 1935.

Personals

W. R. Webster

W. R. Webster, Chairman of the Board, Bridgeport Brass Company, Bridgeport, Conn. was recently elected a member of the Executive Committee of the American Society for Testing Materials. Mr. Webster has had a long and noteworthy career in the brass manufacturing industry.

Following graduation from Cornell University in 1890 with the M.E. degree, Mr. Webster was associated with Westinghouse, Church, Kerr and Company. In 1892 he was employed by the Aluminum Brass and Bronze Company, later a branch of the Bridgeport Brass Company, and he became superintendent (1893) of the Bridgeport Copper Company. In 1897 he became foreman of the rolling mill, Bridgeport Brass Company and was successively superintendent, raw material department; general superintendent, vice-president and Chairman of the Board, which position he now holds. He has been a member of the A. S. T. M. since 1909 and holds membership on many of its committees. He is active in the work of other organizations, is past chairman, A. S. M. E. Research Committee. He is a member of the S. A. E., A. I. M. E., Institute of Metals (England), and is a Fellow of the Royal Society of Arts. He has taken a leading part and is an officer in many civic and charitable organizations in Bridgeport.

W. R. WEBSTER

Harold L. Geiger has joined the field staff of the development and research department of International Nickel Company, 67 Wall Street, New York. Mr. Geiger will operate for the first few months out of the Detroit office of the company located in General Motors Building, later making his headquarters in New York.

O. W. McMullan is now with the research laboratory of the International Nickel Company at Bayonne, N. J. Mr. McMullan was formerly chief metallurgist at the Timken-Detroit Axle Company, Detroit.

Clyde E. Davis, formerly superintendent Homestead Valve Manufacturing Company, Coraopolis, Pa., and retiring president of Pittsburgh Foundrymen's Association has been active in association work for the past seven years. Recently he was elected president of the Non-Ferrous Foundrymen's Association, Pittsburgh. During his 10 years connection with the Homestead company as general superintendent, Mr. Davis had a broad experience in production of high test gray iron castings as well as pressure bronze and Monel metal castings. Mr. Davis has left the Homestead company and is now with the Russell, Birdsall, Ward Company of Coraopolis, Pa.

Lyman C. Athy, metallurgical and ceramic engineer of Detroit, Mich., has just been appointed superintendent of manufacturing operations for the new plumbing division of the Briggs Manufacturing Company, Detroit. Mr. Athy, who graduated in metallurgy from Ohio State University, formerly was in charge of enameling and research for General Electric Company, in which capacity he

directed the development and manufacture of enamel frits.

Walter L. Tann has joined Farrel-Birmingham Company, Inc., Ansonia, Conn., in the engineering department. Mr. Tann has had a diversified experience in various phases of mechanical engineering and industrial management, acquired in several lines, particularly on heavy hoisting, material handling and hydraulic machinery.

Albert D. Wilson has been chosen by directors of Bristol Brass Corporation, Bristol, Conn., to succeed the late Alexander Harper, as president of the corporation. Mr. Wilson will continue in the position of treasurer. **Frederick M. Seibert** is to fill the vice-presidency vacancy due to the promotion of Mr. Wilson. Mr. Wilson started in the company as a factory employee 33 years ago. He is a native of Bristol, and was made a bookkeeper of the concern in 1904 and cashier in 1907. He was elected assistant treasurer in 1918 and three years later became vice-president at the time Mr. Harper succeeded the late A. F. Rockwell, as president. In March, 1929, he was made vice-president and treasurer.

Robert C. Stanley, president of International Nickel Company of Canada, Ltd., was awarded the honorary degree of Doctor of Engineering by Stevens Institute of Technology at its 63rd commencement exercises held in the William Hall Walker Gymnasium building at Castle Point, June 9th.

S. C. Spalding of the American Brass Company, Waterbury, Conn., has been nominated for Trustee of the American Society for Metals.

Donald McDonald, recently associated with Aluminum Industries, Inc., Cincinnati, Ohio, has been made a vice president of that company.

Donald A. Crosset has been appointed secretary-treasurer and general manager of the Alloy Metal Wire Company, Inc., Moore, Pa. He will take complete charge of the plant production and sales activities.

C. H. Reeme has been appointed treasurer of the Udylite Company, Detroit, Mich., having been advanced from assistant treasurer.

Gustaf Soderberg, technical director of The Udylite Company, Detroit, Mich., sailed for Europe May 18th, for a trip of about two months' duration, which will combine business and pleasure. He was accompanied by Mrs. Soderberg.

Obituaries

Alexander Harper

Alexander Harper, aged 57 years, president of the Bristol Brass Corporation, Bristol, Conn., died recently at his home in Farmington, Conn., after an illness of a month.

Mr. Harper was born in New Britain, January 15, 1878, son of the late Samuel B. and Mary (Smith) Harper. He received his education in the grammar and high schools of New Britain, and in the Sheffield Scientific School at Yale with the class of 1898. Mr. Harper came to Bristol in 1903 and affiliated with the American Silver Company, a subsidiary of the Bristol Brass Company, and was placed in charge of the Chicago office as manager. He returned to the home plant in 1910 and continued in the sales department for a time, later being placed in the factory. He was elected president and general manager of American Silver Company in 1916 and under his careful management the company was very successful. In 1925 he was elected president of the Bristol Brass Corporation, succeeding the late Albert F. Rockwell. He was also a director of the Bristol Bank and Trust Company, of the Acme Wire Company, New Haven and of the Hartford County Manufacturers' Association.

Mr. Harper had a number of fraternal affiliations. He was a member of all of the Masonic Lodges up to Washington Commandry, Knights Templar of Hartford. His widow, Mrs. Olive Costella Harper, four sisters and four nephews survive.

B. F. Mueller

B. F. Mueller, vice-president and operating head of Mueller Brass Company, Fort Huron, Mich., died recently in that city, as a result of injuries suffered in an automobile accident.

Frank S. Waters

Frank S. Waters, aged 57, president of the Lyon Metal Products Company, Aurora, Ill., died suddenly of a heart attack on June 6 at his country estate four miles west of Aurora. Mr. Waters headed the firm which he and his brother Beverly L. Waters founded in 1889.

Mr. Waters was born March 2, 1878, in Hackensack, N. J., the son of Mr. and Mrs. Frank S. Waters, his father being engaged in the manufacturing business. It was in Chicago that he received his early education and there he and his brother opened their first sheet metal plant, turning out the same line that the firm handles today. The company was moved in 1906 to its present location. The firm name was then Lyon Metallic Manufacturing Company. In 1928 Lyon Metallic and Durand Steel Locker Company, Chicago Heights, were merged, the consolidated companies taking the name, Lyon Metal Products Company. Mr. Waters became president of the new company while W. B. Brown, principal owner of Durand company, was made treasurer.

Surviving Mr. Waters are his wife, Mrs. Mable Kilbourne Waters, and two brothers, Beverly L. Waters and Raymond T. Waters of Chicago. Mr. Waters' clubs were the Union League of Chicago and Aurora, the Aurora Country Club and the Elks.

William H. Smith

William H. Smith, died on June 3rd, aged 61 years, after a four months' illness. He was president and general manager of Pioneer Alloy Products Company, Cleveland, Ohio. Mr. Smith organized the Pioneer company in 1919 and previously had been connected for some years with the Cleveland Brass and Manufacturing Company.

John Cox

John Cox, retired founder of the Cox Brass Foundry, Albany, N. Y., died recently. Mr. Cox was 85 years old. He sold the business which he had founded to his sons in 1915 and after several years of traveling about the world, he and Mrs. Cox settled in Ocean Grove at 30 Heck Avenue. He had a hobby, which was to make and collect old brass novelties. In the 20 years of his retirement he gathered what is probably the finest and most notable collection of casts and patterns of Abraham Lincoln. Besides his collection of novelties, Mr. Cox was creating in brass, everything from door-knockers to casts of John Bunyan.

Mr. Cox was born in Wallsal, Staffordshire, England, August 1, 1851. He came to the United States and settled in Troy. There were three sons in the family, John W. who died, and William and Theodore who are now conducting the business at Albany, having purchased the interest of John W. Cox.

E. C. Miller

Edward C. Miller, president of Magnolia Metal Company, Elizabeth, N. J., died recently of heart disease in his apartment in the Robert Fulton Hotel, 228 W. 71st Street, New York. Mr. Miller was 77 years old.

A native of Mobile, Ala., Mr. Miller came north as a young man and forty-nine years ago established the Magnolia Metal Company, which has ever since been engaged in the manufacture of non-ferrous metals. Mr. Miller was greatly interested in labor questions. He was also active in religious affairs, and was a thirty-second degree Mason. His widow, Laura B. Miller and a son, Arthur F. Miller, survive.

H. M. Kinsey

H. Merritt Kinsey, 44 years old, 1224 Cayuga Drive, assistant manager of the American Brass Company, Buffalo, N. Y., died on June 8th. Mr. Kinsey was a native of the former village of La Salle, and attended the Niagara Falls High School, Syracuse University and the University of Buffalo. He entered the employ of the American Brass Company fifteen years ago. Mr. Kinsey was a past president and honorary member of the Industrial Relations Association of Buffalo and a former director of the Western New York Credit Association. Mr. Kinsey's wife, three children and his father, survive.

Edward Allen Colby

Edward Allen Colby died suddenly of a heart attack at his home in Maplewood, N. J., June 1st. Mr. Colby was 78 years old, and was born at St. Johnsbury, Vt. He graduated from Yale University in 1880. Two years later he became associated with Dr. Edward Weston at Newark, N. J. He invented an induction electric furnace for which he received a medal from the Franklin Institute. About 1900 he became chief engineer and superintendent of the Newark plant of the Baker Platinum Works, retiring from that position in 1930, and at the time of his death he was secretary and also consulting engineer for the company.

Homer D. Coleman

Homer D. Coleman, president of the Consolidated Brass Company, died at his home in Detroit on Tuesday afternoon, June 18. He was 60 years old. In 1913 he became president of the The American Lubricator Company of which he previously had been a director, and a short time later became president of The Consolidated Brass Company.

He is survived by his widow and one daughter.—F. J. H.

Industrial and Financial News

Metal Developments

American lead and zinc products, particularly batteries, were sharply affected by general increase in French tariff rates, from 18 to 25%. It is hoped that a special decree will be issued soon restoring the lower rates formerly in effect.

Radium is a most convenient and easy material to steal. The small quantity of 50 milligrams valued at $3,500 was recently taken from the safe of a hospital in Brooklyn. It may have been easy to steal but it will be very hard to sell.

American output of **magnesium** rose markedly in 1934. The quantity of magnesium ingots sold was 4,249,838 pounds, an increase of 196 per cent over the record for 1933. The output in 1930 was only 559,631 pounds. Detailed figures showing the amount of magnesium that goes into various types of products can be obtained from the U. S. Bureau of Mines, Washington, D. C.

A Permanent Exhibit of **Metals and Plastics** will be opened at Rockefeller Center, New York, on September 1st by Metal Products Exhibits, Inc. The exhibition will be devoted wholly to those who specify and purchase materials and parts for industrial purposes. **Herbert R. Simonds** is vice-president and general manager.

At a meeting of **producers of secondary aluminum** held in Chicago, June 13, 1935, it was unanimously agreed to maintain as a minimum the wage scales and a number of the articles in the former code of fair competition of the secondary aluminum industry.

The good visibility of **aluminum paint** plus its exceptional protective qualities have resulted in its widespread application for highway purposes, painting bridges and similar work, according to the communication from the Aluminum Company of America.

Metal bags were recently used for shipping potato chips in a test to determine the effect on these chips of rapid atmospheric and climatic changes. According to information from the Reynolds Metals Company, 19 Rector Street, New York, the chips arrived in excellent condition, without a trace of rancidity, in spite of the fact that they were kept in non-ventilated compartments at from 80 to 95 degrees.

Japan is making strong efforts to develop the commercial production of aluminum from deposits of alunite. Technical difficulties have slowed up the work and although 2,500 to 3,000 tons of metal were produced in 1934, the quality is not altogether satisfactory, according to Trade Commissioner Paul Steintorf, of the Department of Commerce, stationed in Tokyo, Japan.

Business Items-Verified

MacDermid, Inc., Waterbury, Conn., announce that they have made several additions to their sales organization. **Theodore Starr** will cover New York City; **Louis Edleman** will cover New Jersey and Pa., and **John Yingling,** Massachusetts.

Louis Allis Company, Milwaukee, Wis., has appointed **Harris-Green Company,** 1101 Farmers Bank Bldg., Pittsburgh, Pa., as engineering sales representatives in the western Pennsylvania territory. Harris-Green Company is newly organized and composed of **G. N. Harris** and **J. G. Green.** Associated with them is **Henry Harris,** organizer and former president of United Electric Light Company, Wilmerding, Pa.

Apollo Metal Works have moved their general offices to Princeton, Ill., and are now considering a proposition of setting up a manufacturing unit along the railroad tracks in the northern part of the city.

Chicago Eye Shield Company announces the opening of its Michigan Branch, L. E. Averill, district manager, 6530 Hamilton Avenue, Detroit.

Ford Metal Manufacturing Company, 43 E. Ohio Street, Chicago, Ill., recently organized as a subsidiary of American Asphalt Paint Company, same address, has taken over plant and business of Andrews, Field and McCormick, Chicago. They will operate at plant at Kankakee, Ill., in conjunction with works of parent company at that place. The following departments are operated: brass machine shop, spinning, stamping, plating, polishing and grinding room.

Atlas Smelting and Refining Works, Inc., 77 Delevan Street, Brooklyn, N. Y., has just been chartered to produce solder, babbitt metals, pig lead, caulking lead and other white metals and alloys, and to engage in smelting and refining of metals. S. A. Silverman is president and A. Toorock, treasurer. This firm operates a smelting and refining department.

Headly Engraving Works, 4376 Ogden Avenue, Chicago, Ill., general engraver of molds, steel, brass, etc., marking dies, has let general contract for a one-story addition, 50 x 125 ft. The firm operates a tool room, and will use additional equipment.

The **C. J. Tagliabue Manufacturing Company,** Brooklyn, N. Y., manufacturers of Temperature, Pressure, Flow, Humidity, Time and Level Instruments, announces the appointment of **E. D. Wacker,** as Assistant General Sales Manager. Sales of the Snapon Controller Division will be in charge of **R. A. Skinner.**

The **Donald Sales and Manufacturing Company,** Milwaukee, Wis., will act as sales agent and distributor in Wisconsin, for the complete line of products of The Udylite Company, Detroit, Mich.

The Carborundum Company, Niagara Falls, N. Y., is erecting a three-story building, 75 x 80 ft., and is making changes and remodeling two buildings adjacent to this building.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

July 1, 1935.

All of the brass concerns and affiliated industries of the city, both small and large, are still maintaining the wage and hour scales that were in effect before the NRA was declared invalid. In fact, in most cases the wage and hour scales in effect when the NRA began were more favorable to the workers than the minimum rates under the codes. Immediately after the NRA was declared invalid, local manufacturers met and agreed to maintain the present schedules of wages and hours as long as competitors did the same. A few industrial plants in the city have cut wages since the decision but they are in the textile business or some line not remotely connected with metals.

According to the Chamber of Commerce, employment in concerns employing 65 persons or more was 29,057 for May, a gain of 310 over April but 1,777 below that of May, 1934. In the eight largest factories the employment for May was 15,294, a gain of 232 over April but 1,353 less than in May, 1934. Bank clearings were $5,926,000, an increase of $1,166,200 over April and an increase of $110,000 over May, 1934. Electric consumption was 11,463,861 KWH, a gain of 112,737 over April and of 822,752 over May, 1934. Electric consumption is taken as an accurate barometer of industrial activity.

Carl Kraft, a reorganization engineer, has been elected president of the **E. J. Manville Machine Company. Robert D. Kelly** has been elected treasurer; and **Attorney Terrence F. Carmody,** secretary and assistant treasurer. **Charles T. Brennan,** the former secretary and treasurer, has resigned.

Attorney Carmody says that the reorganization does not mean any change in the ownership of the plant. The controlling interest is still held by the estate of **Daniel T. Hart.** Mr. Kraft was connected with the reorganization of the **Waterbury Clock Company** and the reorganization of the **Beardsley and Wolcott Manufacturing Co.** and is also active in **Industrial Properties, Inc.** which has negotiated the sale or lease of several abandoned local factory buildings.—W. R. B.

Connecticut Notes

July 1, 1935.

HARTFORD—The strike at the **Colt's Patent Fire Arms Manufacturing Company** has practically ended, due largely to the NRA decision, as the strike was based on alleged violation of the NRA. It was also hurt by the attempt last month to bomb the home of the president of the company, **Samuel M. Stone. Harold Taylor,** secretary of the Hartford Structural Building Trades Alliance, **Charles Carron,** former supernumerary policeman, his brother-in-law, **Thomas Raymond,** employed by a construction company, and **Edward Raffo,** a striker, were arrested on charge of conspiracy and using explosives intended to injure persons or property. Six others were arrested on charge of wilful injury to a private building as the result of the stoning of the home of **Michael Lynch,** an employee of the company.

The Colt's concern is operating its electrical division on a 40 hour week schedule, the increase from 36 hours having been due to competitive labor conditions on recommendation of the **National Electrical Manufacturers' Association.** There has been no reduction in pay. The directors of the company, at their regular meeting last month, voted a special payment of 5 per cent for employees on earnings or wages during April, May and June. A similar payment was voted three months ago. The directors also declared a dividend of 31¼ cents a share, payable June 29 to stock of record June 8. This is at the rate as increased in the previous quarter. The greater part of the strikers have returned to work and the plant is operating on full schedule.

The **Hart Manufacturing Company** has formed a subsidiary, **Hart Manufacturing Company (Canada) Ltd.,** and is establishing a factory in Toronto for manufacture of its products. It also has a factory in England.

The Wiremold Company is planning a factory addition 90 by 138 feet, three stories high, and a smaller building 60 by 70 feet and two stories high.

BRISTOL—Frederick G. Hughes, vice-president and general manager of the **New Departure Company** states that the NRA decision will not affect the company's policies. No adjustments were made when the codes went into effect as the wage and hour requirements were above the code requirements. About 4,000 are employed in the local plant and 1,700 in Meriden.

BRIDGEPORT — The Bridgeport Brass Company, in a report to the secretary of state, reports the issue of $976,860 additional capital consisting of 195,372 shares, par $5, making the outstanding capital, $3,256,200.

The **Bullard Machine Company** has reecived substantial orders for several Mult-au-Matic and Contin-U-Matic vertical multiple spindle machines, enough to keep the plant at capacity for three months with day and night shifts. Employment is now being given to 700 mechanics, an increase of 30 per cent since January 1. Employment expansion is contemplated. The company is now the busiest it has been since 1930. Although it did not earn as much in the first four months of 1935 as in the same period in 1934 its unfilled orders are much over a year ago.

NEW BRITAIN—The Goss & Deleuw Machine Company reports production and sales for the first five months of the year equalled the total for the entire year of 1934. This year's business has been pleasing in that it did not originate exclusively from the automobile industry. The increased interest on the part of manufacturers of plumbing supplies and brass goods is especially satisfactory.

MERIDEN—The International Silver Company has declared a dividend of $1 a share on its 7 per cent cumulative preferred stock, payable July 1 to stock of record June 14.

TORRINGTON — The Torrington Company has declared the regular quarterly dividend of $1 a share on its common stock, payable July 1 to stock of record June 20.

BRANFORD—The Atlantic Wire Company plans the immediate construction of four buildings, two warehouses, three stories high, one 80 by 120 feet and the other 80 by 150 feet, a cleaning house 150 by 35 feet and a storage house 140 by 60.—W. R. B.

Providence, R. I.

July 1, 1935.

During the month of May this year the payroll distributions by Rhode Island industries engaged in the manufacture of products of non-ferrous metals totaled $126,191, a sum 13.6 per cent smaller than the distributions of the preceding month but only 4.2 per cent smaller than payrolls disbursed in the corresponding month of 1934. In the jewelry and silverware industries the total distribution last month amounted to $779,060 a loss of 3.3 per cent from the preceding month, but a gain of 18.2 per cent as compared with the payroll distribution in May of last year.

Pursuant to recommendations of the Executive Committee of the Council of Jewelry and Allied Industries, the Code Authority for the Medium and Low-priced Jewelry and the officers of the Metal Finding Manufacturers Association have circularized these industries advising that the essential features in the NRA codes be continued. Informal meetings of some of the official representatives of jewelry manufacturers have revealed a general sentiment that the majority of the provisions set up under the code should be continued.

White & Cola Manufacturing Company, Inc., of this city, has filed notice that it has changed its corporate name to the **United Jewelry Company, Inc.**

Fergus McOsker, attorney, has been appointed by the Superior Court as receiver for the **Providence Metal Frame Company.**

The **Automatic Chain Company** of Providence has been incorporated for the conducting of a manufacturing jewelry business with an authorized capital stock of $25,000 consisting of 250 shares of common stock of $100 each. The incorporators are: **Frederick W. Bopp** of Cranston; **Anna Bopp** and **Johanna Mohrenheim.**

Among recent statements of ownership that have been filed at the City Clerk's office are the following: **Rhode Island Grinding Service,** 48 Logan Avenue, owned by **Arcangelo Bentrami;** the **Manufacturers' Soldering Company,** 19 Calendar Street, by **Gaetano Zagarella;** the **De Luxe White Metal Casting Company,** 112 Waterman Street, by **Charles Dansereau** of 16 Fairview Road, Pawtuket.—W. H. M.

Middle Atlantic

Newark, N. J.

July 1, 1935.

The **Radio Corporation of America** and the **General Electric Company** have instituted suit in the Federal Court against the **Arcturus Radio Tube Company,** of Newark, for damages. The Newark company is charged with exporting goods in violation of a patent agreement which allegedly licensed it to sell tubes only in the United States. In 1934, the complainants report, the Arcturus Company exported 300,000 tubes to England, France and Italy without payment of royalties.

Merck & Company, Rahway, are erecting a new administration building and office structure. One building will be four stories, 44 by 212 feet, with two wings. The structures will cost $200,000. The cutlery factory of **J. H. Henchels, Inc.,** Irvington, was recently badly damaged by flames.

Joseph Plana Company, Inc., of Newark, has been incorporated with $10,000 to manufacture silverware.—C.A.L.

Trenton, N. J.

July 1, 1935.

A new industry that is rare to this section has been added to New Jersey's mineral production enterprises by the commercial production of diatomite from a pit near Stanhope, Sussex County. It is a yellow powder like substance used in insulation.

Metal industry plants in Trenton are continuing to operate under the old NRA codes. The John A. Roebling's Sons Company announces no change in labor rates or hours.

Following concerns have been chartered here: **Ornamental Art Metal Works,** Jersey City, 2,500 shares, no par; **Berkshire Color & Chemical Company,** Paterson, 1,000 shares, no par; **Grossbard, Inc.,** chemicals, Lyndhurst, 50 shares, no par; **Kimia Laboratories, Inc.,** Paterson, chemicals, $100,000.—C.A.L.

Middle Western States

Toledo, Ohio

July 1, 1935.

Industrialists in this area have passed through trying experiences during the last few weeks. Labor disputes, particularly in the electric field which shut off power for several days, all coming about the time of scrapping of the NRA, upset business and industry alike.

Conditions are clearing rapidly now and with the final settlement of the labor troubles in sight it is expected manufacturing shortly will be back to normal.

Of course the mid-summer dull period is near, but it is not believed this will be of long duration. August should bring a revival and by September conditions probably will be greatly improved. Much is expected of the early fall and preparations are being made accordingly.

The **J. C. Miller Company** which has its principal offices and warehouse in Grand Rapids, has been awarded a contract by the **American National Company,** in Toledo, to design, furnish and supervise the installation of a modern chromium plating plant which will cost about $40,000.—F. J. H.

Detroit, Mich.

July 1, 1935.

With the NRA now ineffective the non-ferrous metal industry in this area is gradually pulling itself together in an attempt to get back to some degree of normalcy. While everything seems to be in a muddle at present there are plenty of optimistic souls who think little is to be feared and that the future has much in store.

Industry thus far shows little change, one way or another, as a result of the momentous decision of the United States Supreme Court. The motor car industry, the business barometer of the middle West, still holds its own from a production standpoint, although there is evidence of the near approach of a midsummer slowing up, something that always happens and which seldom gives industrial leaders much to worry about. Every one feels that by September production will be more active than it was in the early spring.

After two years of idleness, the plant of the **Sanford Brass Manufacturing Company,** Imlay City, Mich., has resumed operations, producing faucets and other plumbing products. **Mark Sanford,** president, announces that the company has orders on hand sufficient to keep the plant in operation for a considerable time.

George R. Rich, Sr., who founded the present **Wilcox-Rich** automobile valve plant in Battle Creek, Mich., has announced plans for a new organization for the purpose of manufacturing various types of automobile necessities. Articles of incorporation have been filed for the **Rich Manufacturing Company,** which, it is claimed, will be producing within the next two or three months valves, tappets, cylinder heads, and also household gas meters.

The **Aluminum and Architectural Metals Corporation,** 1974 Franklin Street, Detroit, has been incorporated by **Paul R. Marshall.** The capital stock consists of 500 shares of no par value.

The **Ford Motor Company,** is now employing approximately 81,000 persons in the Detroit area. Including both inside and outside of Detroit the number is recorded as 126,000. During the last month the company announced the restoration of the old $6 a day minimum, bringing the rate up to the pre-depression level of 1929. It extends to all parts of the world where Ford cars and materials are produced.—F. J. H.

Pacific States

Los Angeles, Calif.

July 1, 1935.

Gaffers & Sattler, large stove and range manufacturers in the Central Manufacturing district here, are now building an $80,000 addition to their factory and electric refrigerators will also be pushed ahead. The new addition includes a modern enameling plant, as well as complete plating, etc. They will employ a total of about 300 men.

The **U. S. Spring & Bumper Company** are spending another $100,000 in enlarging their plant.

The **Thermador Electric Company** of 116 Llewelyn St., will erect a large factory in the Hostetter Industrial Tract.

The **Royal Metal Manufacturing Company** of Chicago, are starting a branch plant here, at 1208 South Hill St., to make chrome modernistic furniture, **Irving Solomon** is president of the company.

The **Union Die Casting Company** are making a small home ice shredding machine at 2269 East 51st St.

The **Sterling Products Company** of 129 West 3d St., are making a new sanding and polishing machine for small shops and production lines.

The **U. S. Electric Manufacturing Company** of 200 East Slauson Ave., are making a new vari-speed electric motor from 25 to 1000 r.p.m. and can be slowed down to 1 r.p.m—H. S.

Metal Market Review

Copper was decidedly unsettled in character after the crack-up of the N. R. A., and the consequent elimination of the control effected by the Copper Code. Very quickly, however, copper producers under the auspices of the U. S. Copper Association took over the work formerly handled by the Code Authority, and are undertaking to formulate a plan to regulate the market legally. The copper fabricators have unanimously expressed their desire to cooperate with the producers in keeping the market stable. Consequently, although doubt, hesitation and unrest exist, the American "Blue Eagle" copper prices did not change, remaining at 9c for electrolytic throughout most of the month. Foreign copper fluctuated of course, on the weak side.

Late in the month, news leaked out that a large lot of copper had been sold at 8c. Additional news stated that the producers had given up their efforts to cooperate, and the market was thrown open. This left the whole trade in a nervous condition at the end of the month.

Zinc is unchanged in price at 4.30 for Prime Western E. St. Louis. Demand was quiet the early part of the month, firmed up a little later and turned dullish the latter part of June, but without effect on the price.

Tin was also rather dull with very few changes, ranging from 51.75 in the latter part of May, down to 50.50. Trading was quiet throughout with no tendencies discernible in any direction.

An analysis of tin consumption has been issued by the International Tin Research and Development Council, 149 Broadway, New York.

Lead was reactionary, slipping toward the end of May from 4.20 to 4.10, and dropping suddenly in June to 3.95 and then 3.85. The demand was consistently low, but showed a slight improvement during the third week of June largely from battery makers and pigment manufacturers.

Aluminum, unchanged, with no developments. **Nickel**, ditto.

Antimony joined the group of pegged metals, sticking fast at 12.75. Demand was very low until the latter part of the month when orders began to come in, probably to replenish depleted stocks.

Silver was weakish. It began the month at 75.50 and slid down hill steadily, the quotations at the time of writing being 69.50. Speculation in the London market for the account of China and India, accounted for some of the activity, but it led nowhere. The United States Treasury is evidently letting the speculators hold the bag for a time.

World silver output in 1935, according to the American Bureau of Metal Statistics, continues at a higher rate than in 1934. Production during the first four months totalled 63,303,000 ounces compared with 55,154,000 ounces in 1933.

A bill has been introduced in the Senate, authorizing the Secretary of the Treasury to sell silver for commercial use at 60c an ounce or at some other arbitrary price to protect commercial silver users from the fluctuations of the market.

Platinum, unchanged at $30.00 an ounce.

Gold, official price, unchanged at $35.00.

Scrap Metal prices broke sharply with the breaking up of the N. R. A. Copper refineries reduced bids for scrap from ¼ to ½ cents per pound. Secondary aluminum was quieter and brass ingot demands slow. Lead scrap, however, was active with a larger intake. This trend continued steadily and at the time of writing, the market is still unsettled from ¼ to ¾ cents per pound lower than last month.

The Non-Ferrous Ingot Metal Institute reported deliveries in April of 5,698 tons and in May, 4,620 tons. Average prices per pound during the 28-day period ending June 14 were as follows:

Commercial 80-10-10 (1½% Impurities)	9.370c
Commercial 78% Metal	7.008c
Commercial 81% Metal	7.309c
Commercial 83% Metal	7.554c
Commercial 85-5-5-5	7.799c
Commercial No. 1 Yellow Brass Ingot	6.175c

Wrought Metal Market

Fabricators are holding up fairly well on the whole with output equal to or slightly ahead of 1934. The automobile demand has continued longer than expected, but the tapering-off time is directly ahead. Distributors in the Metropolitan territory report June about 15 per cent ahead of June, 1934, and the first six months about 9 per cent ahead of last year. While this breaks no records, it is not discouraging.

Daily Metal Prices for June, 1935

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	May, 1935 27	28	29	31[2]	June, 1935 3	4	5	6	7	10	11	12	13
Copper c/lb. Duty 4 c/lb.													
Lake‡ (del. Conn. Producers' Prices)	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125
Electrolytic‡ (del. Conn. Producers' Prices)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Casting (f.o.b. ref.)	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	51.75	51.70	51.35	51.45	51.20	51.15	51.20	50.90	50.50	50.50	50.50	50.75	51.25
Lead (f.o.b. St. L.) c/lb. Duty 2½ c/lb.	4.20	4.20	4.20	4.10	3.95	3.95	3.95	3.85	3.85	3.85	3.85	3.85	3.85
Aluminum c/lb. Duty 4 c/lb.	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75
Silver c/oz. Troy, Duty Free	75.50	74.00	73.125	74.50	73.875	72.50	72.50	72.25	72.25	73.375	73.00	72.875	72.625
Platinum $/oz. Troy, Duty Free	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

	14	17	18	19	20	21	24	25	26	27	28	High	Low	Aver.
Copper c/lb. Duty 4 c/lb.														
Lake‡ (del. Conn. Producers' Prices)	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	8.125	9.125	8.125	8.982
Electrolytic‡ (del. Conn. Producers' Prices)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	8.00	8.00	9.00	8.00	8.880
Casting (f.o.b. ref.)	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	8.25	7.25	7.25	8.25	7.25	8.037
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.														
Prime Western (for Brass Special add 0.05)	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	51.25	50.75	51.00	51.10	51.00	50.95	51.05	51.25	51.625	51.75	51.80	51.80	50.50	51.074
Lead (f.o.b. St. L.) c/lb. Duty 2½ c/lb.	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	4.10	3.85	3.870
Aluminum c/lb. Duty 4 c/lb.	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.														
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	17.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75	12.75
Silver c/oz. Troy, Duty Free	72.875	72.50	72.50	72.00	72.00	72.00	70.25	69.50	69.50	69.50	69.50	73.875	69.50	71.940
Platinum $/oz. Troy, Duty Free	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

[1] U. S. Treasury price. [2] May 30th—Holiday.

Due to the fact that our June issue went to press a week early in order to be in good time for the Electro-Platers' Convention, the May record of prices went only through May 24th. The balance of the May prices appear in this issue.

Metal Prices, July 1, 1935

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 8.125, Electrolytic, 8.00, Casting, 7.25. **Zinc:** Prime Western, 4.30. Brass Special, 4.40. **Tin:** Straits, 51.75. Pig 99%, 50.50. **Lead:** 4.00. **Aluminum,** 22.00. **Antimony,** 12.75. **Nickel: Shot, 36. Elec., 35.**

Quicksilver: Flasks, 75 lbs., $72.00. **Bismuth,** $1.10. **Cadmium,** 65: **Silver,** Troy oz., official price, N. Y., July 1, 64.75c. **Gold:** Oz. Troy, Official U. S. Treasury price, July 1, $35.00. **Scrap Gold, 6¾c. per pennyweight per karat,** dealers' quotation. **Platinum,** oz. Troy, $30.00.

Duties: Copper, 4c. lb.; zinc, 1¾c. lb.; tin, free, lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	Duty	U. S. Import Tax*
Brass Ingots, Yellow	6⅜ to 7⅞	None	4c. lb.[1]
Brass Ingots, Red	8 to 11	do	do
Bronze Ingots	9 to12¼	do	do
Aluminum Casting Alloys	15½to22	4c. lb.	None
Manganese Bronze Castings	20 to34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to38	do	do
Manganese Bronze Ingots	9 to13	do	4c. lb.[1]
Manganese Copper, 30%	11½to16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	10 to12	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	13¼to15	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	11½to14	do	do
Phosphor Tin, no guarantee	61to75	None	None
Silicon Copper, 10%	18 to30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$32.—	None	None
Iridium Platinum, 10%	$33.—	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6⅜to 6⅝	Free	4c. per pound on copper content.
Light copper	5¼to 5¾	Free	
Heavy yellow brass	3⅜to 3⅝	Free	
Light brass	3 to 3⅜	Free	
No. 1 composition	4⅞to 5⅛	Free	
Composition turnings	4⅝to 4⅞	Free	
Heavy soft lead	3 to 3¼	2½c.lb.	None.
Old zinc	2¼to 2⅜	1½c.lb.	
New zinc clips	2¾to 3	1½c.lb.	
Aluminum clips (new, soft)	12¼to13¼	4c.lb.	
Scrap aluminum, cast	9¼to10	4c.lb.	
Aluminum borings—turnings	5 to5½	4c.lb.	
No. 1 pewter	30 to32	Free	
Electrotype or stereotype	2⅞to3	2½c. lb.*	
Nickel anodes	30 to33	10%	
Nickel clips, new	31 to33	10%	
Monel scrap	11 to18½	10%a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since June 27, 1935. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	15c.	2½c. lb.
Bare wire, soft, less than carloads	11.75c.	25% a. v.
Seamless tubing	15¼c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	13⅝c.	14½c.	15⅛	4c. lb.	U. S. Import Tax 4c. lb. on copper content.
Wire	14⅛c.	15 c.	15⅝	25%	
Rod	12⅛c.	15 c.	15½	4c. lb.	
Angles, channels	21⅝c.	22¾c.	23⅛	12c. lb.	
Seamless tubing	15⅜c.	16 c.	16¾	8c. lb.	
Open seam tubing	21⅜c.	22¼c.	23⅛	20% a. v.	

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	22⅞c.	10% Quality	25¾c.
15% Quality	25 c.	15% Quality	30⅛c.
18% Quality	26¼c.	18% Quality	33⅛c.

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	15¾c.
Muntz or Yellow Rectangular and other sheathing	16⅞c.
Muntz or Yellow Metal Rod	13¼c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb. 32.80
Aluminum coils, 24 ga., base price, tons lots, per lb.....30.50

ROLLED NICKEL SHEET AND ROD

Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods .....50c. Cold Rolled Sheet .....60c.
Hot Rolled Rods .....45c. Full Finished Sheet .....52c.

MONEL METAL SHEET AND ROD

Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base) ....35 Full Finished Sheets (base) 42
Cold Drawn Rods (base) ...40 Cold Rolled Sheets (base) 50

SILVER SHEET

Rolled sterling silver (July 1) 70c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	7.50	2⅜c. lb.
Cut Lead Sheet (base price)	7.75	2⅜c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty Free)

This list applies to either block tin or No. 1 Brittannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over .....15c. above N. Y. pig tin price
100 to 500 lbs. .....17c. above N. Y. pig tin price
Up to 100 lbs. .....25c. above N. Y. pig tin price
Up to 100 lbs. .....25c. above N. Y. pig tin price

Supply Prices on page 270.

Supply Prices, July 1, 1935

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper: Cast	16½c. per lb.	**Nickel:** 90-92%	.45 per lb.
Electrolytic, full size, 14c.; cut to size	14c. per lb.	95-97%	.46 per lb.
Rolled oval, straight, 14½c.; curved,	15½c. per lb.	99%+cast, 47c.; rolled, depolarized, 48.	
Brass: Cast	14½c. per lb.	**Silver:** Rolled silver anodes .999 fine were quoted July 1, from 73c. per Troy ounce upward, depending upon quantity.	
Zinc: Cast	.08⅜c. per lb.		

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85
		Any Quantity		
4 to 6	Under ½,	$5.00	½-1, $4.85	1 to 3, $4.75
1½ to 4	"	5.55	" 5.40	" 5.35
1 to ½	"	5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick. On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less are quoted:

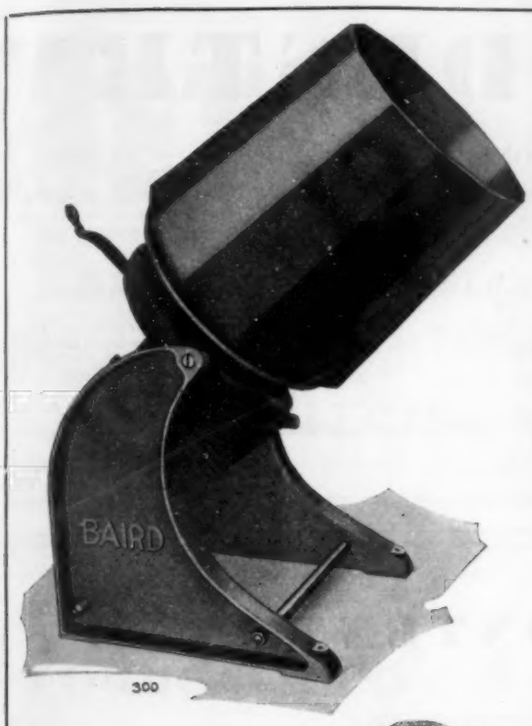
16" 20 ply 84/92 Unbleached	$76.30
14" 20 ply 84/92 Unbleached	58.51
12" 20 ply 84/92 Unbleached	44.01
16" 20 ply 80/92 Unbleached	63.81
14" 20 ply 80/92 Unbleached	49.02
12" 20 ply 80/92 Unbleached	36.96
16" 20 ply 64/68 Unbleached	56.32
14" 20 ply 64/68 Unbleached	43.32
12" 20 ply 64/68 Unbleached	32.72
½" Sewed Buffs, per lb., bleached or unbleached	48c. to 1.12

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	lb.	.13½-.16
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.05¼-.05¾
Chromic, 400 or 100 lb. drums		.15¾
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.13½-.14½
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¾-.04
Powdered, barrels	lb.	.0390-.0415
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.0245-.0295
Cadmium oxide, 50 to 1,000 lbs.	lb.	.65
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	21½-23½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.21
Carbonate, 53/55% cu., bbls.	lb.	.14½-.16½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	4.55-5c.
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.,	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) 100% synth., drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.13-.14
Salts, double, 425 lb. bbls.	lb.	.13-.14
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07¼-.08⅝
Potassium—Bichromate, casks (crystals)	lb.	.08⅝
Carbonate, 96-98%	lb.	.07⅝
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Gold Cyanide	oz.	$15.45*
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.57⅜*
Cyanide, 100 oz. lots	oz.	.65-.70
Nitrate, 100 ounce lots	oz.	.48⅝*
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.17½-.22
Beryllium fluoride ($2NaF.BeF_2$)	lb.	4.30-7.00
Gold Cyanide	oz.	$17.10*
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.15-3.30
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.0375
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, drums	lb.	.33½-.36½
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.38½
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Cyanide (100 lb. kegs)	lb.	.37
Chloride, drums, bbls.	lb.	.07½-.10
Sulphate, bbls.	lb.	.03-.037

*Gold and silver products subject to fluctuations in metal prices.



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